US009497931B1

(12) **United States Patent**
Liang et al.

(10) **Patent No.: US 9,497,931 B1**
(45) **Date of Patent: Nov. 22, 2016**

(54) **PET GROOMER AND VACUUM CLEANER**

(71) Applicant: **SUZHOU VACS ELECTRICAL CO., LTD.**, Taiping Town (CN)

(72) Inventors: **Yu Liang**, Taiping Town (CN); **Jinsong Peng**, Taiping Town (CN)

(73) Assignee: **SUZHOU VACS ELECTRICAL CO., LTD.**, Jiangsu (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/164,771**

(22) Filed: **May 25, 2016**

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/761,393, filed on Feb. 7, 2013, now Pat. No. 9,374,982.

(30) **Foreign Application Priority Data**

May 25, 2012 (CN) 2012 1 0166508
Aug. 9, 2012 (CN) 2012 1 0282678

(51) **Int. Cl.**
A01K 13/00 (2006.01)
A47L 9/06 (2006.01)
A47L 7/02 (2006.01)

(52) **U.S. Cl.**
CPC ***A01K 13/002*** (2013.01); ***A01K 13/00*** (2013.01); ***A47L 7/02*** (2013.01); ***A47L 9/0613*** (2013.01)

(58) **Field of Classification Search**
CPC A01K 13/001; A01K 13/00; A45D 24/32; A45D 20/52; A45D 24/40; A46B 13/02; A46B 7/10; A47L 7/0066; A47L 7/009; A47L 9/0613; A47L 11/4044
USPC 119/600, 601, 608, 609, 611, 613, 616, 119/625, 626; 15/402, 410; 132/112
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,894,905 A * 1/1933 Fechtenburg A47L 9/02 132/116
2,953,808 A * 9/1960 Carmack A45D 24/32 132/125
3,308,500 A * 3/1967 Woodruff A01K 13/002 119/606
3,626,546 A * 12/1971 Dove A01K 13/002 15/373
3,668,736 A * 6/1972 Loscalzo A47L 9/06 15/347
4,630,329 A 12/1986 Shores
4,799,460 A * 1/1989 Kuhl A01K 13/002 119/606
5,095,853 A * 3/1992 Kruger A01K 13/002 119/606

(Continued)

FOREIGN PATENT DOCUMENTS

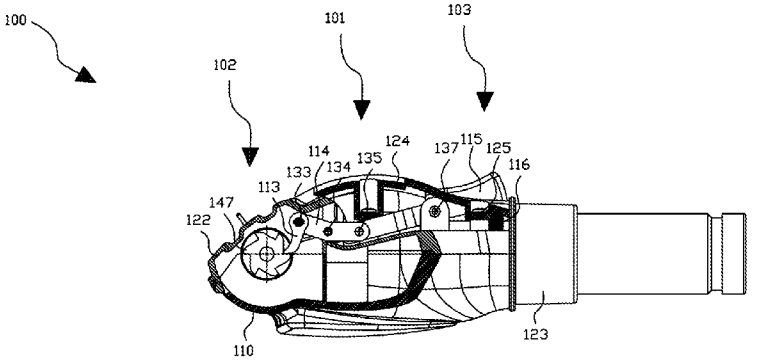
CN 101889557 A 11/2010
JP 2009-148398 A 7/2009

Primary Examiner — Yvonne Abbott-Lewis
(74) *Attorney, Agent, or Firm* — Im IP Law PLLC; C. Andrew Im

(57) **ABSTRACT**

A pet groom and vacuum cleaner including the pet groomer are provided. The pet groomer includes a main body having two sidewalls, an actuator container, and a hollow handle for connecting with the suction hose. A comb assembly is fixed between said two sidewalls, and includes a rotatable body, and a comb teeth arranged in an axial direction of the rotatable body. A driving assembly drives the comb teeth to rotate with the rotatable body. The comb teeth rotates between a first position and a second position. The driving assembly is isolated from the suction airflow and includes an actuator element exposed out of the actuator container and extending toward the hollow handle. Motion transmission elements of the driving assembly extends from the actuator element to the comb assembly, and includes three sections.

6 Claims, 20 Drawing Sheets



(56) **References Cited**

U.S. PATENT DOCUMENTS

5,115,765	A *	5/1992	El Omary	A01K 13/002 119/606
5,339,840	A	8/1994	Koppel	
5,462,018	A *	10/1995	Louison	A01K 13/002 119/626
5,768,748	A *	6/1998	Silvera	A01K 13/001 119/602
5,918,607	A *	7/1999	Zucker	A45D 24/007 132/119.1
6,055,938	A	5/2000	Klein	
D444,925	S *	7/2001	Monette	D30/158
6,681,775	B2	1/2004	Wang	
7,096,598	B1 *	8/2006	Myatt	A45D 20/52 34/96
7,621,234	B2 *	11/2009	Roy	A01K 13/002 119/613
8,082,887	B2 *	12/2011	Fernandez	A01K 13/002 119/612
8,132,541	B1 *	3/2012	Baer, Jr.	A01K 13/002 119/664
8,555,463	B1 *	10/2013	Laube	A01K 13/001 119/606
8,857,011	B2 *	10/2014	Casper	A01K 13/001 15/344
9,010,276	B1 *	4/2015	Nevitt	A45D 24/32 119/611
2006/0225290	A1 *	10/2006	Bader	B26B 19/042 30/346.51
2009/0126649	A1	5/2009	Porter et al.	
2010/0294209	A1	11/2010	Dyson et al.	
2010/0294210	A1	11/2010	Dyson et al.	
2011/0030620	A1 *	2/2011	Jouan	A01K 13/002 119/611
2011/0180013	A1	7/2011	Kissel, Jr.	
2012/0285395	A1	11/2012	Freidell	
2014/0026822	A1 *	1/2014	Harris, II	A01K 13/002 119/628
2015/0250141	A1 *	9/2015	Ferrentino	A47L 9/06 119/610

* cited by examiner

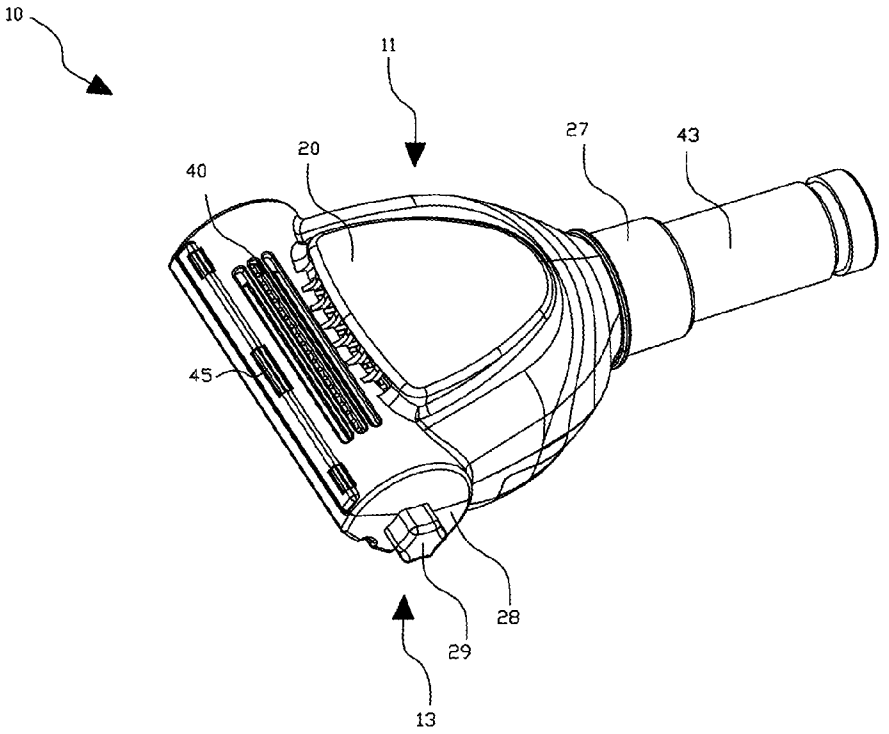


FIG. 1

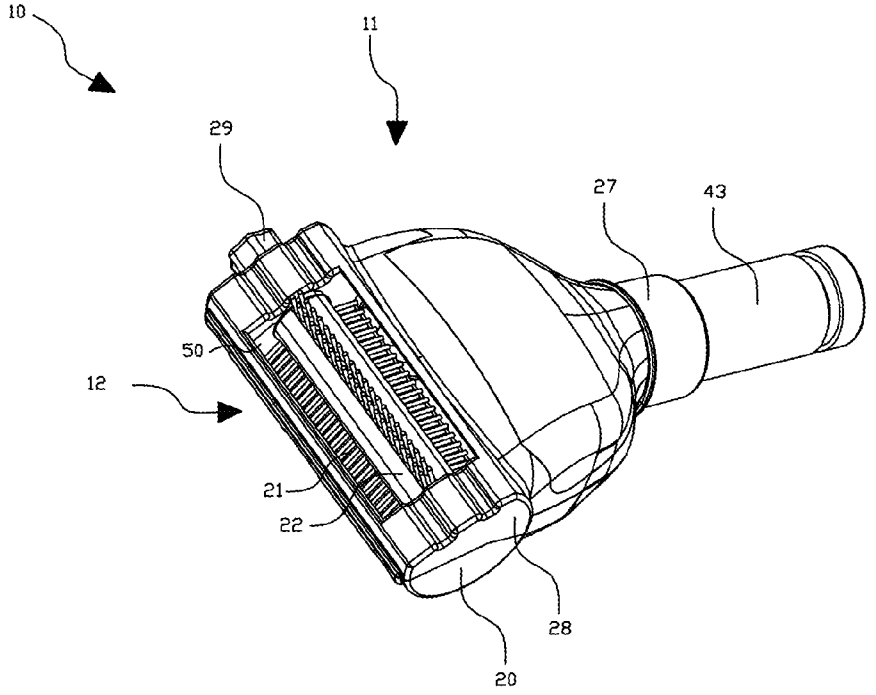


FIG. 2

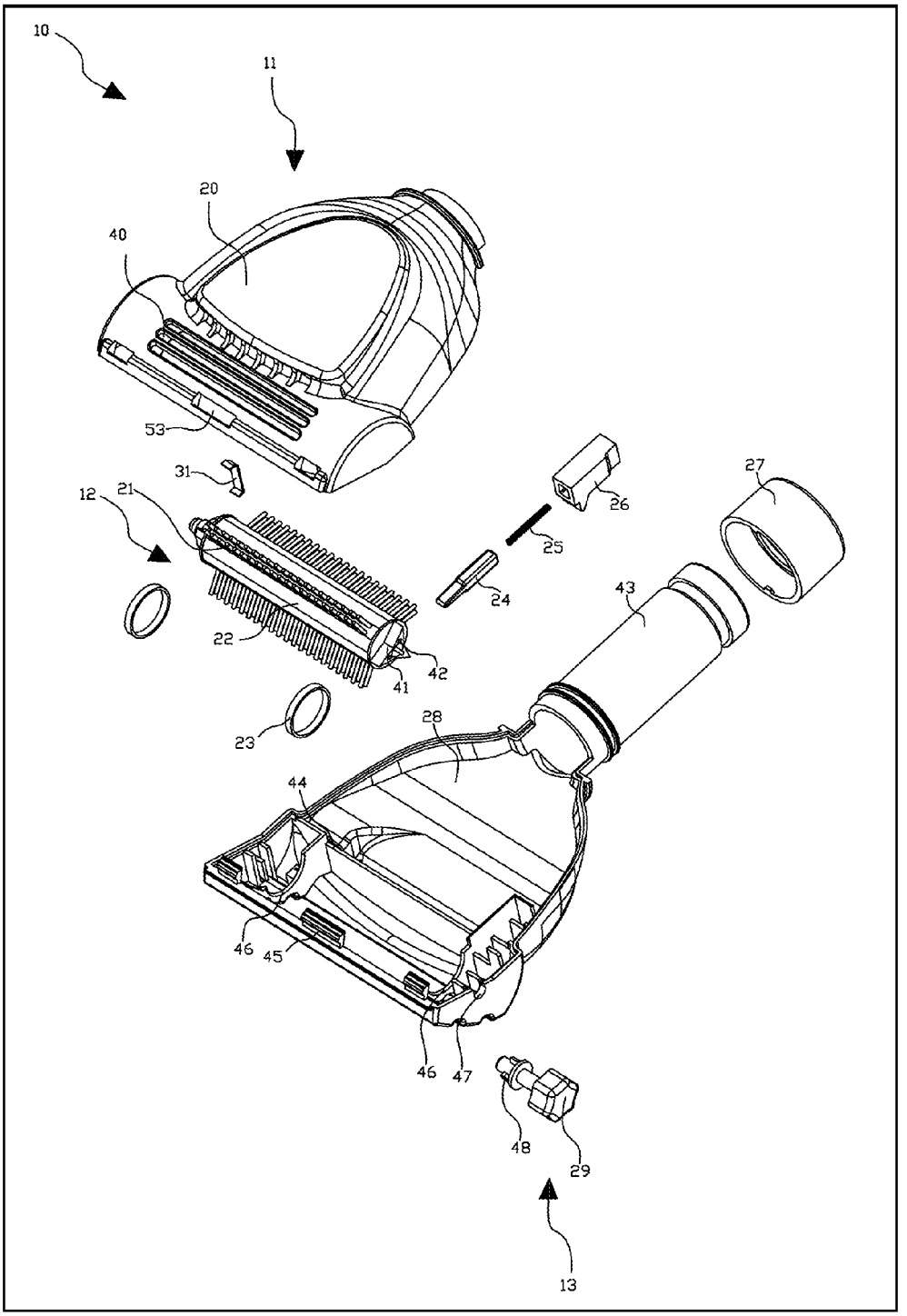

10
11
20
40
53
31
12
21
22
41
42
23
24
25
26
27
43
28
44
46
45
46
47
48
29
13

FIG. 3

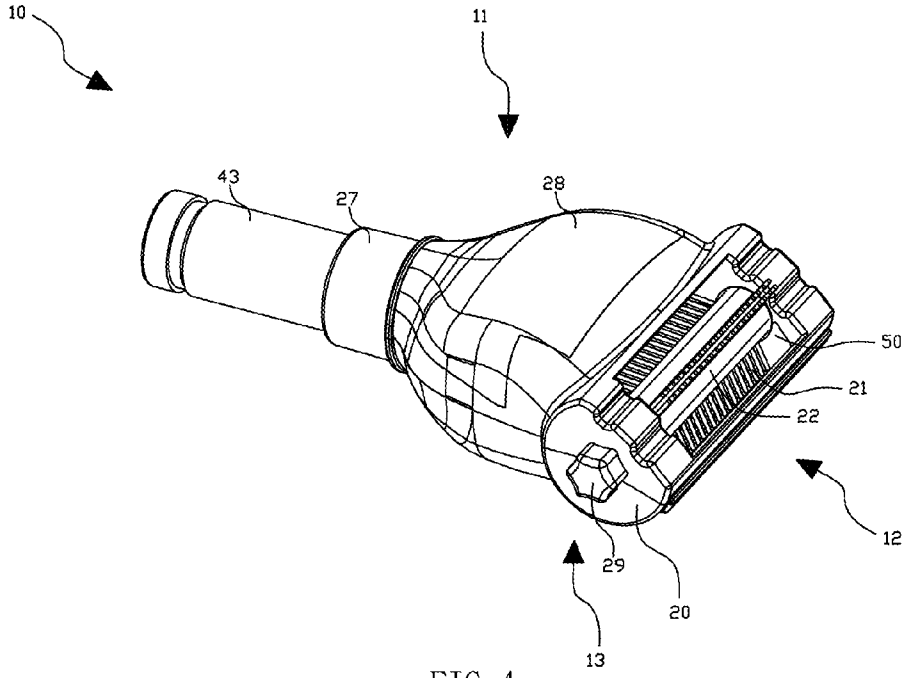


FIG. 4

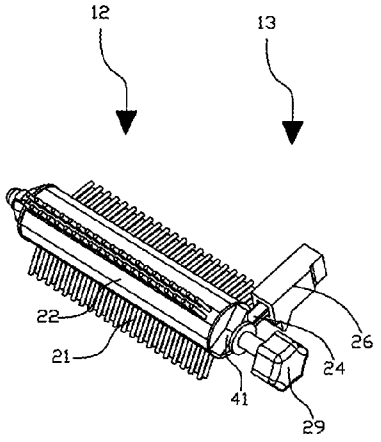


FIG. 5A

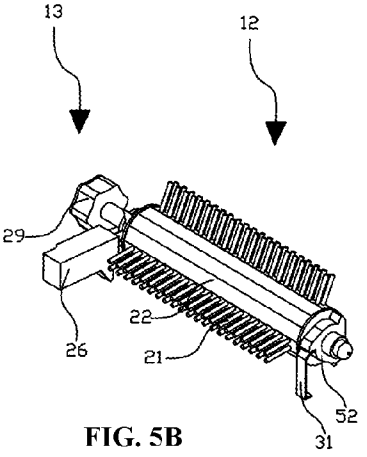


FIG. 5B

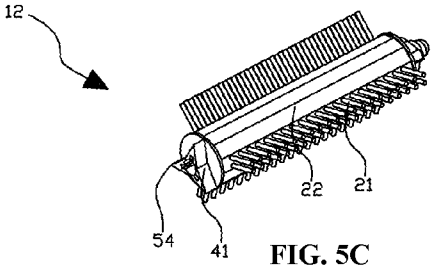


FIG. 5C

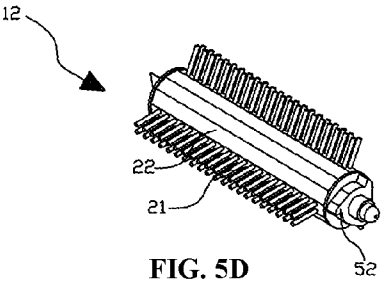


FIG. 5D

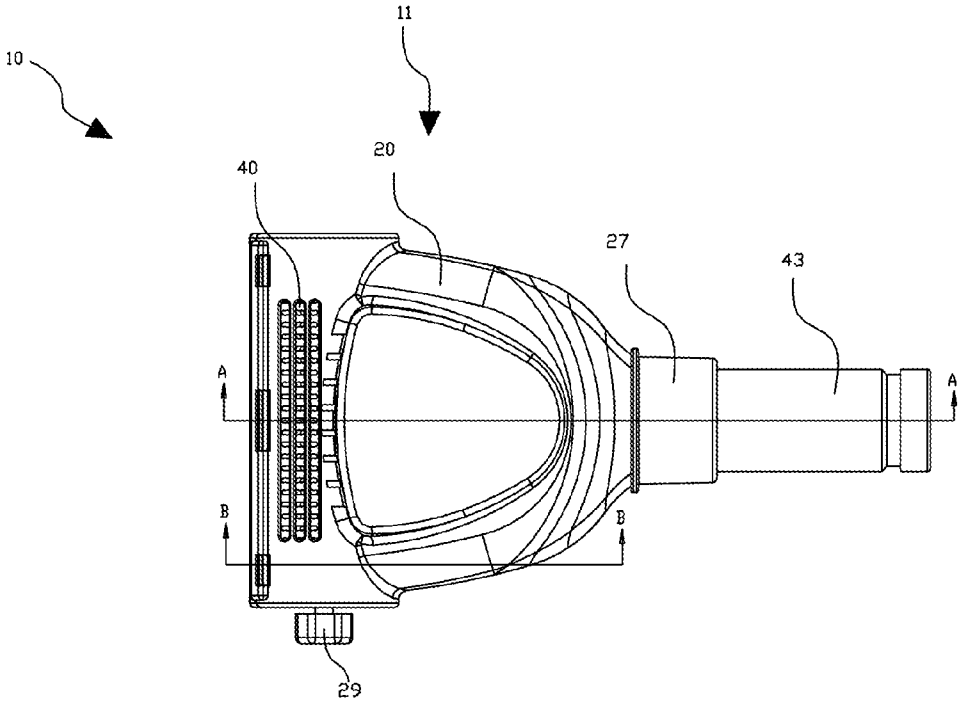


FIG. 6

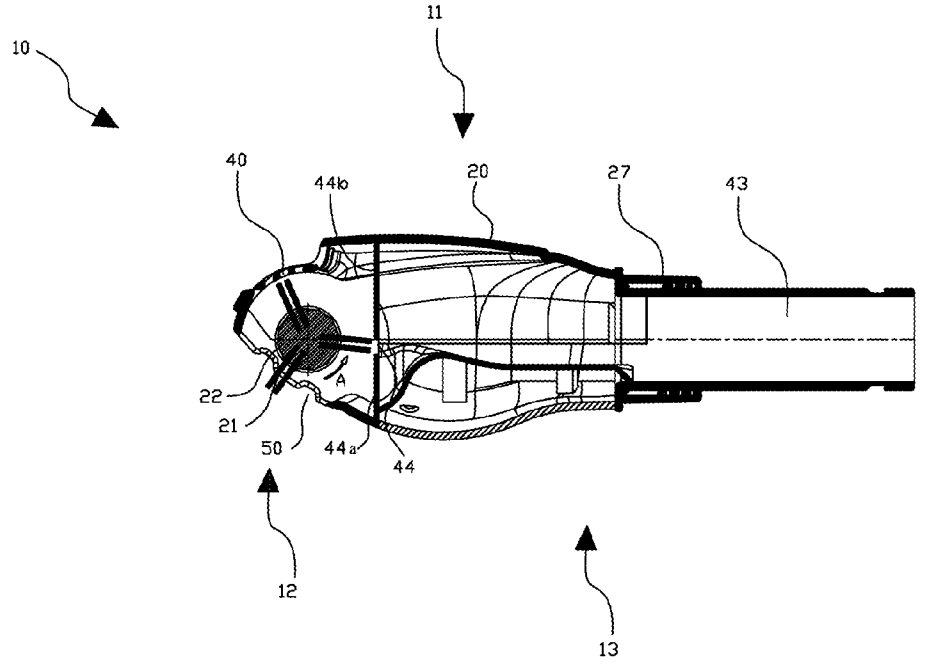


FIG. 7

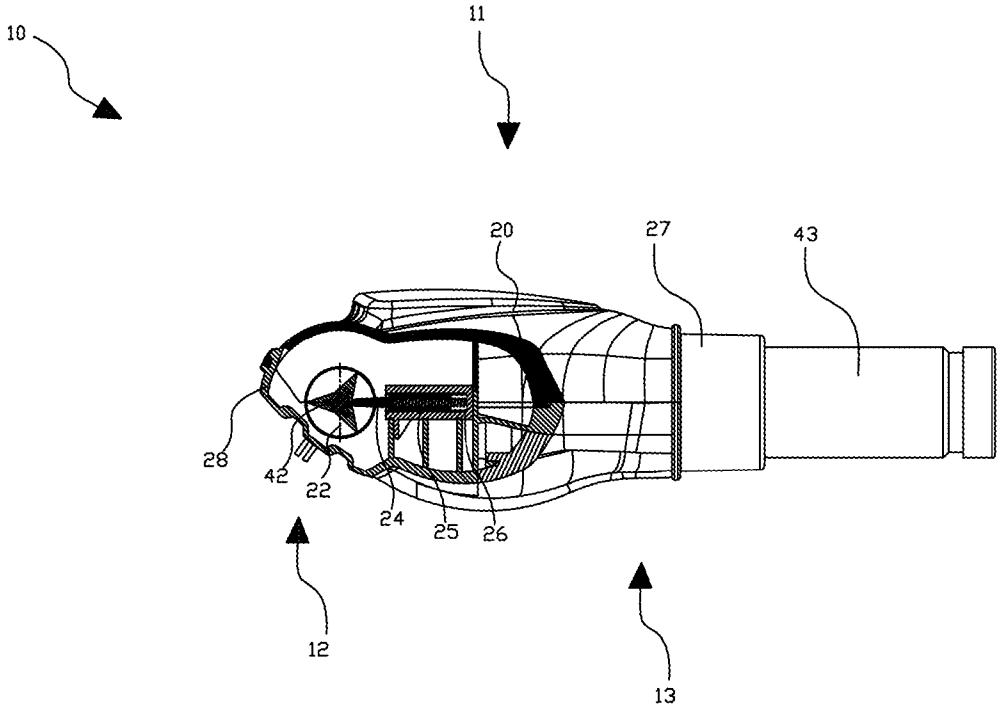


FIG. 8

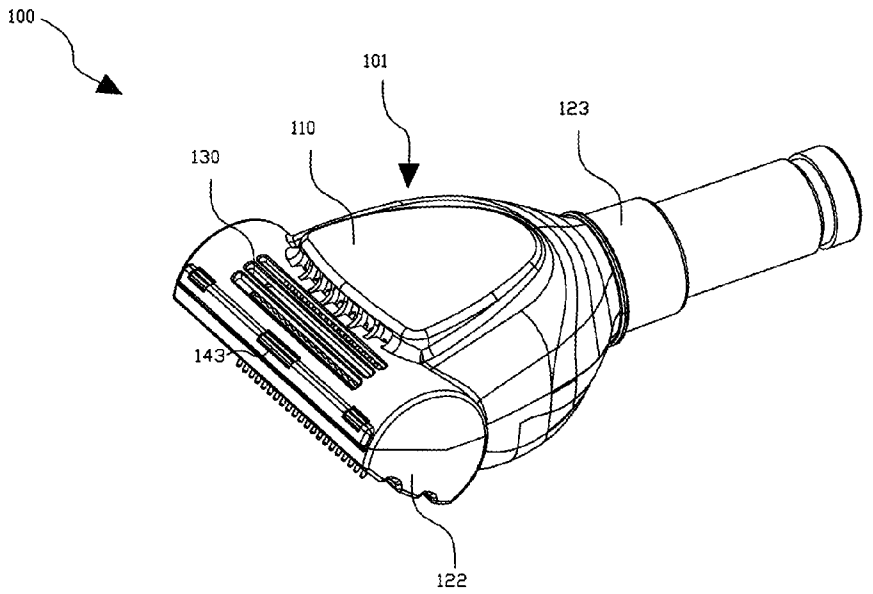

100
101
110
123
130
143
122

FIG. 9

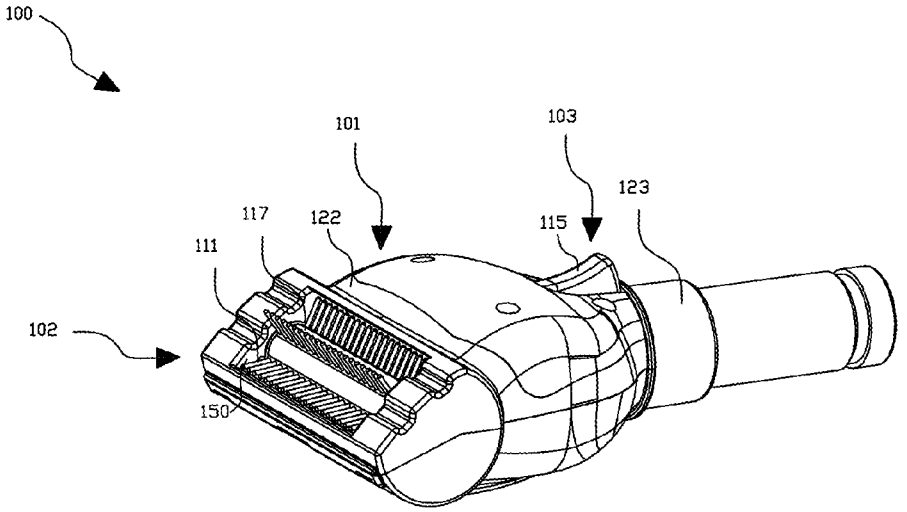

100
101
103
123
117
122
115
111
102
150

FIG. 10

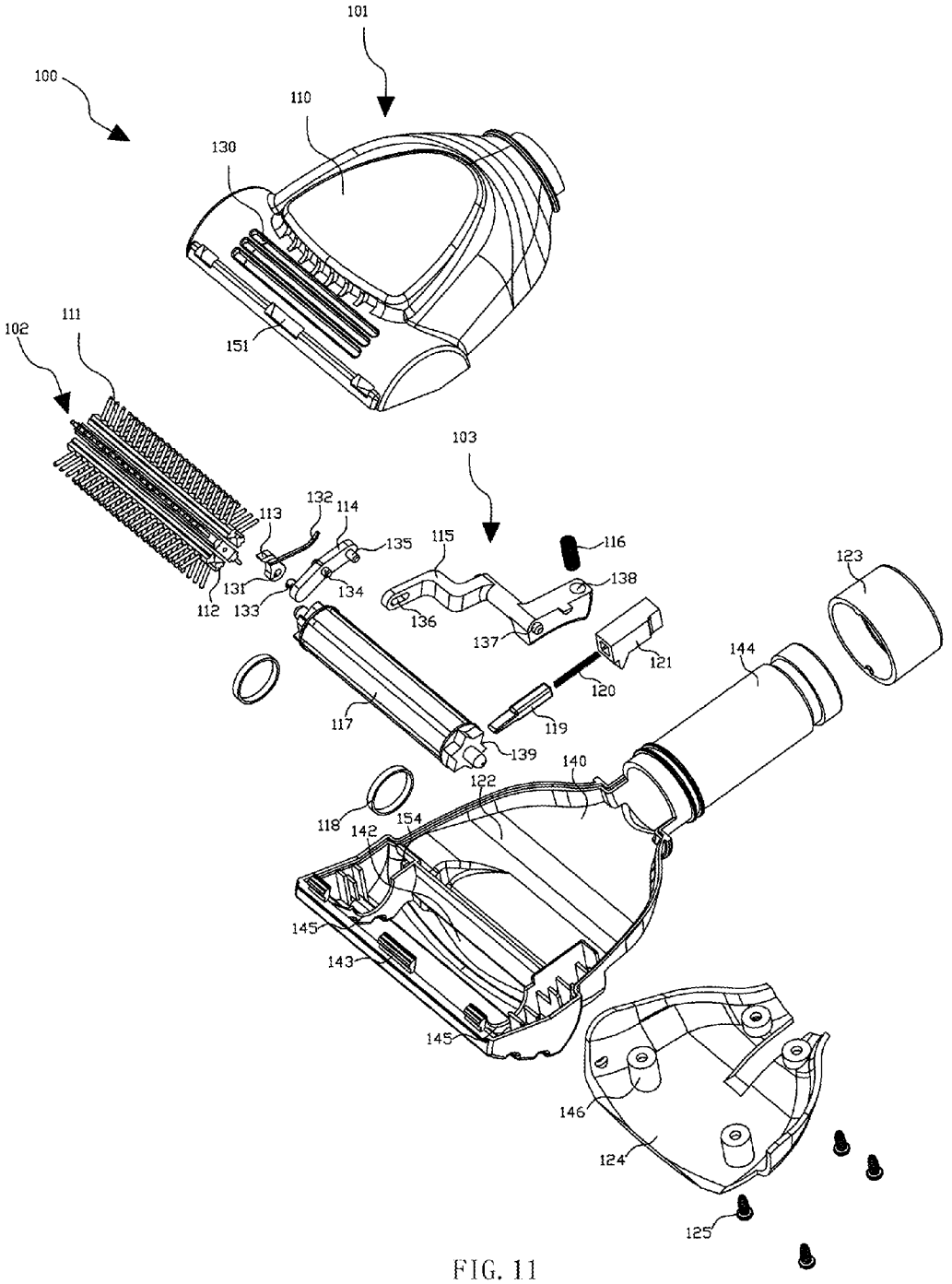

100
101
110
130
151
102
111
103
113
132
114
135
115
116
131
134
138
112
133
136
137
121
123
144
120
117
119
139
140
122
118
142
154
145
143
146
124
125

FIG. 11

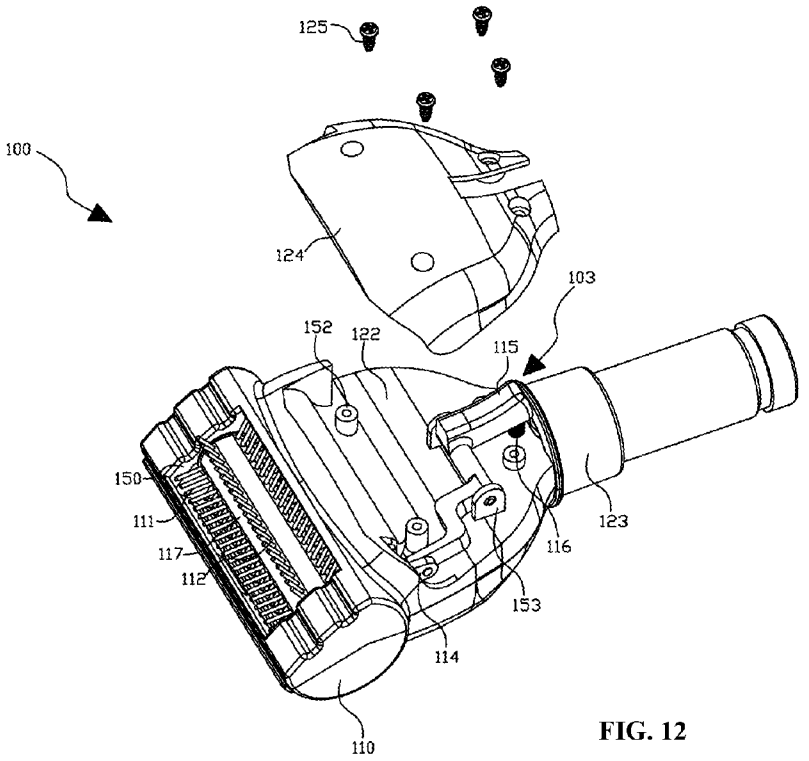


FIG. 12

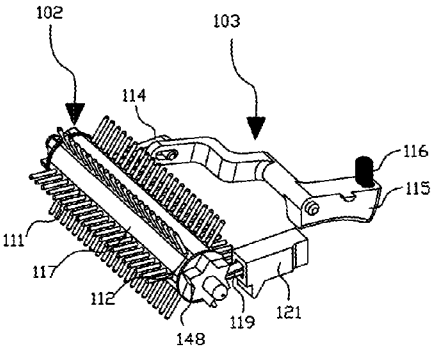


FIG. 13A

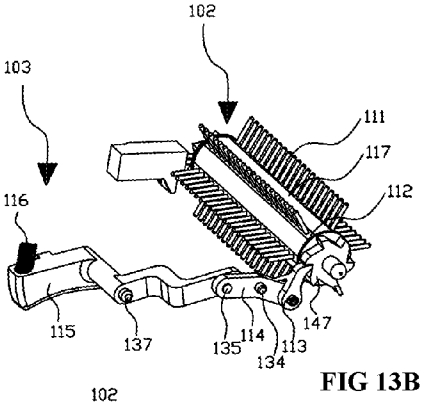


FIG 13B

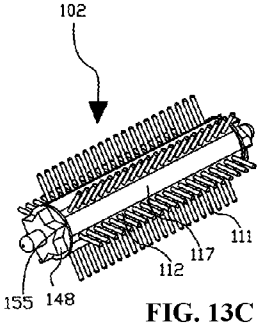


FIG. 13C

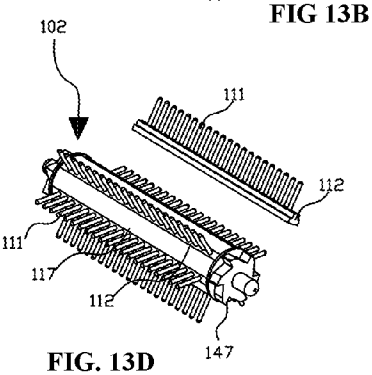


FIG. 13D

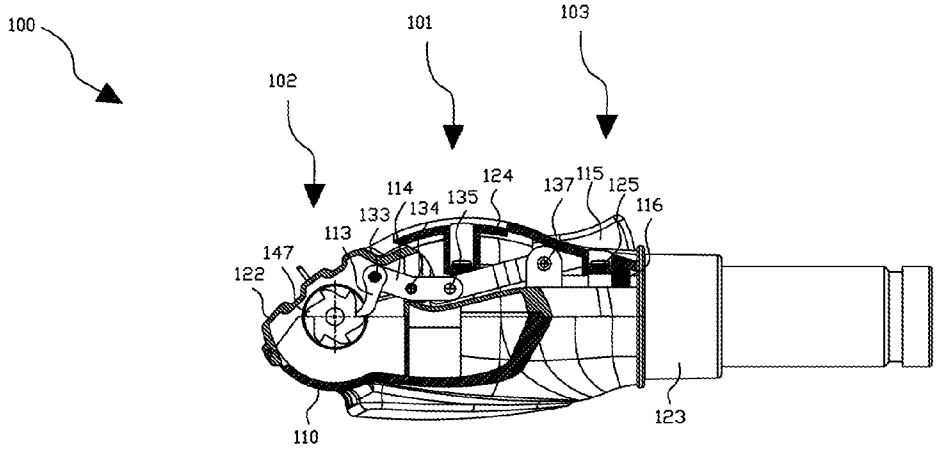

100
101
103
102
114
124
137
115
125
116
135
134
133
113
147
122
110
123

FIG. 14

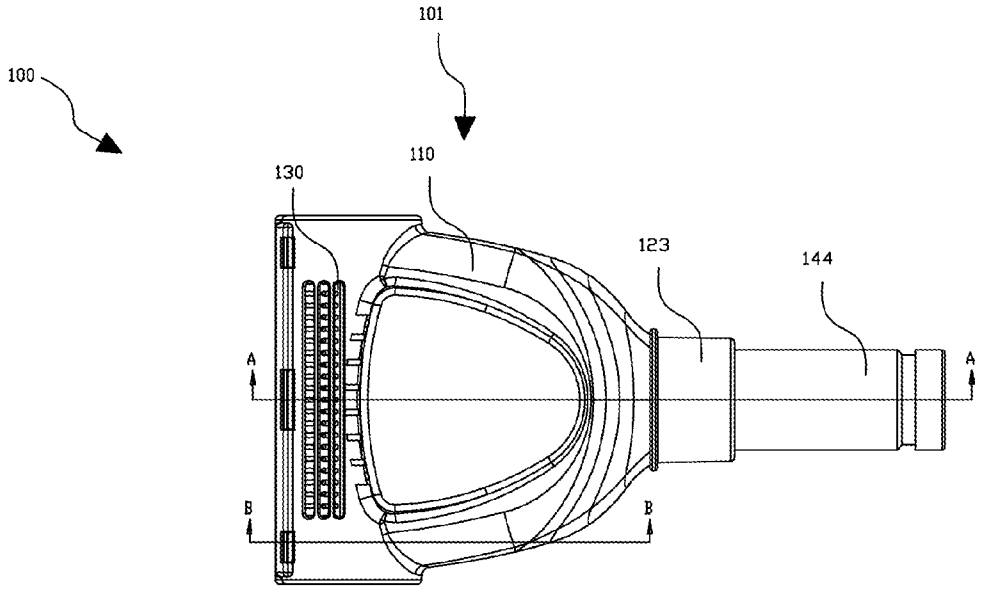

100
101
110
130
123
144
A
A
B
B

FIG. 15

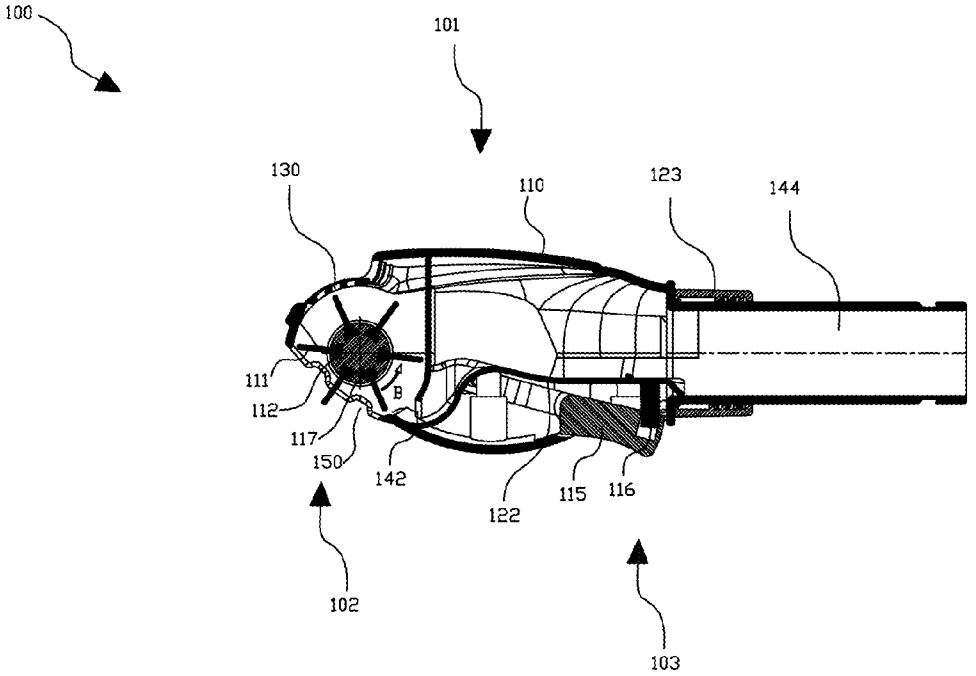

100
101
130
110
123
144
111
112
117
150
142
122
115
116
102
103

FIG. 16

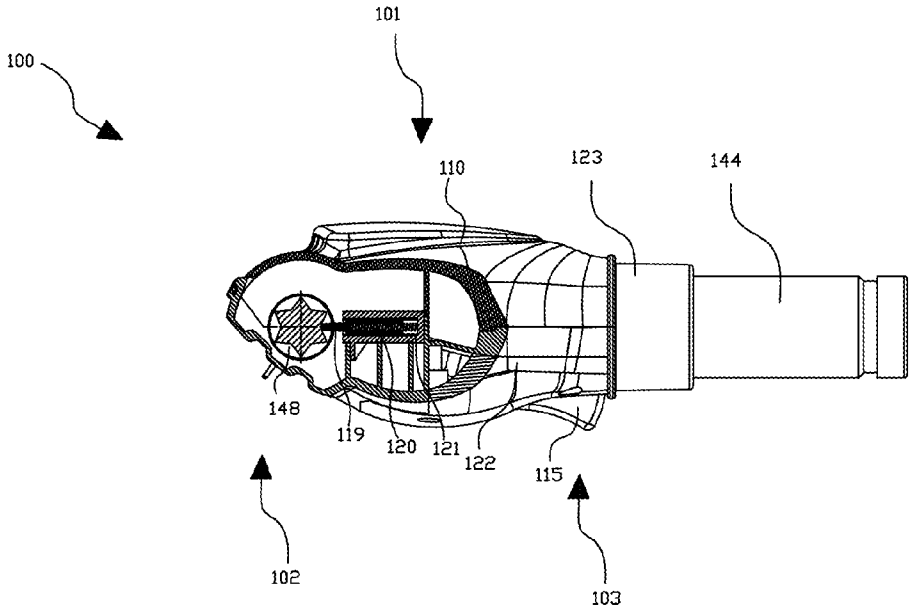

100
101
110
123
144
148
119
120
121
122
115
102
103

FIG. 17

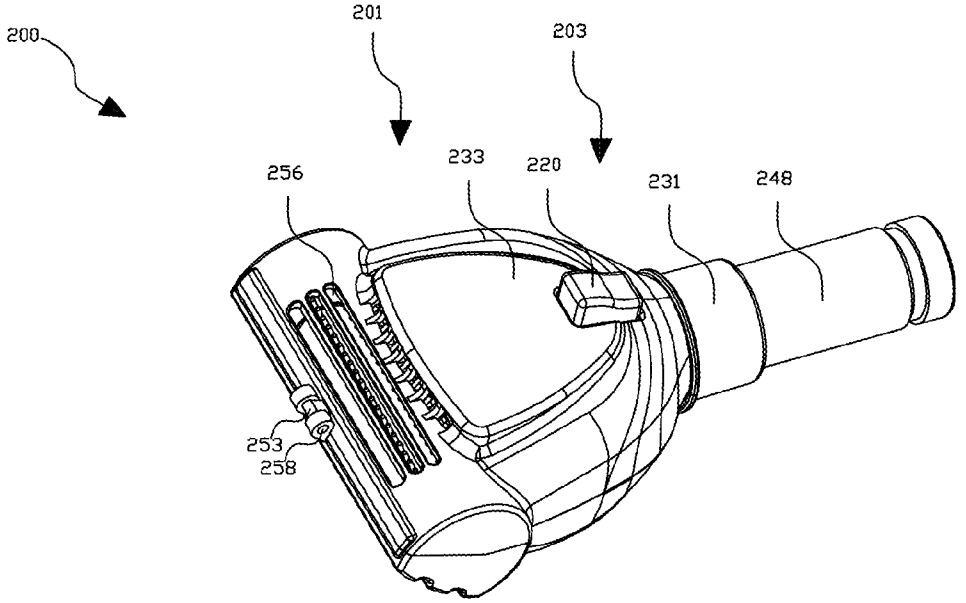

200
201
203
256
233
220
231
248
253
258

FIG. 18

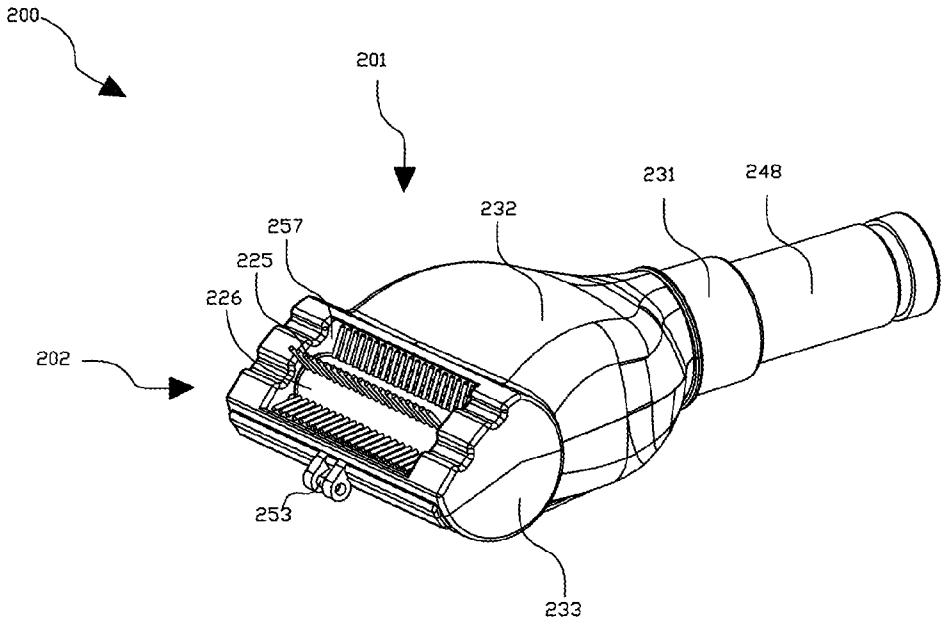

200
201
231
248
232
257
225
226
202
253
233

FIG. 19

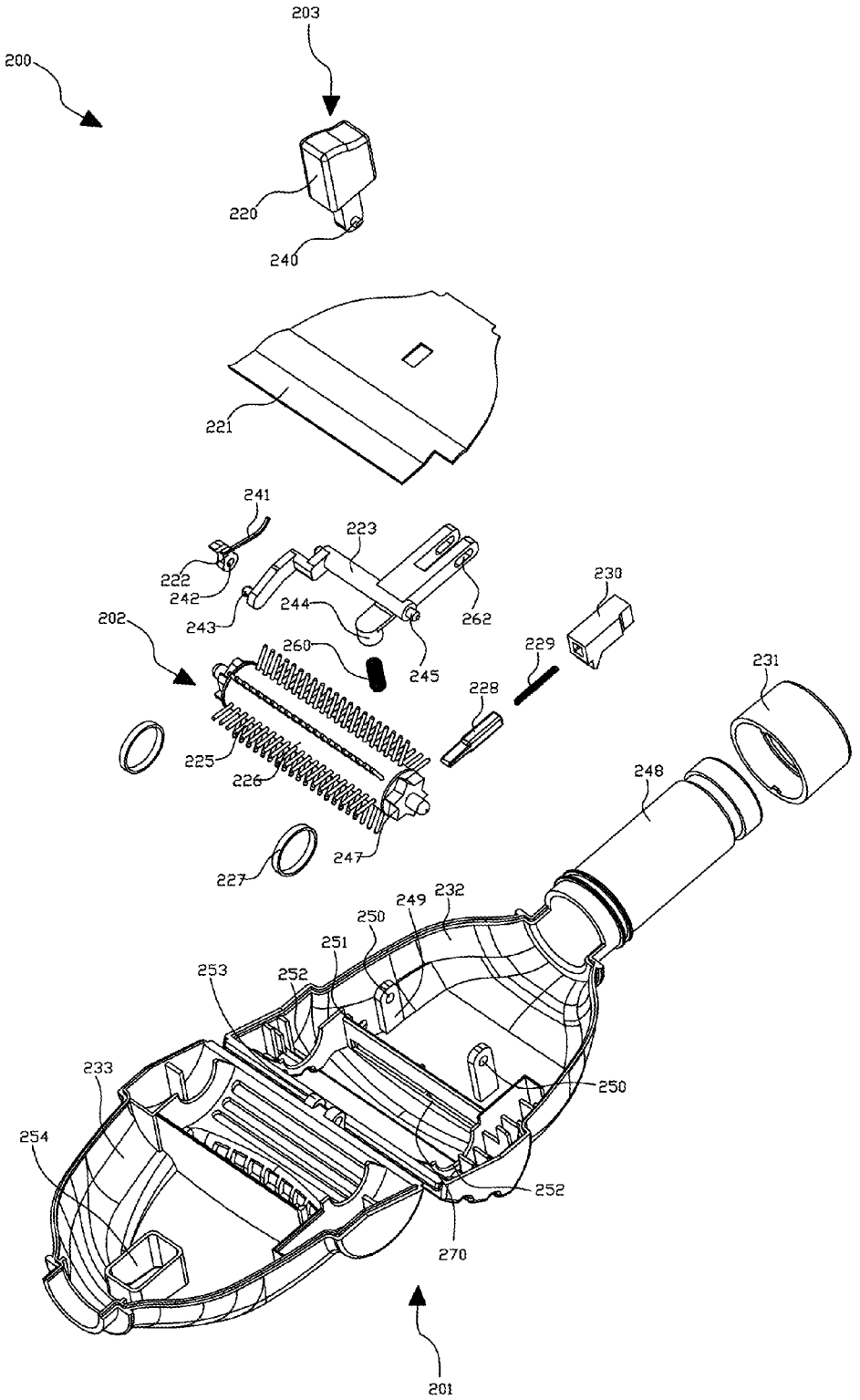

200
203
220
240
221
241
222
242
223
243
244
262
230
202
260
245
229
228
231
225
226
248
227
247
249
232
250
251
253
252
233
250
254
252
270
201

FIG. 20

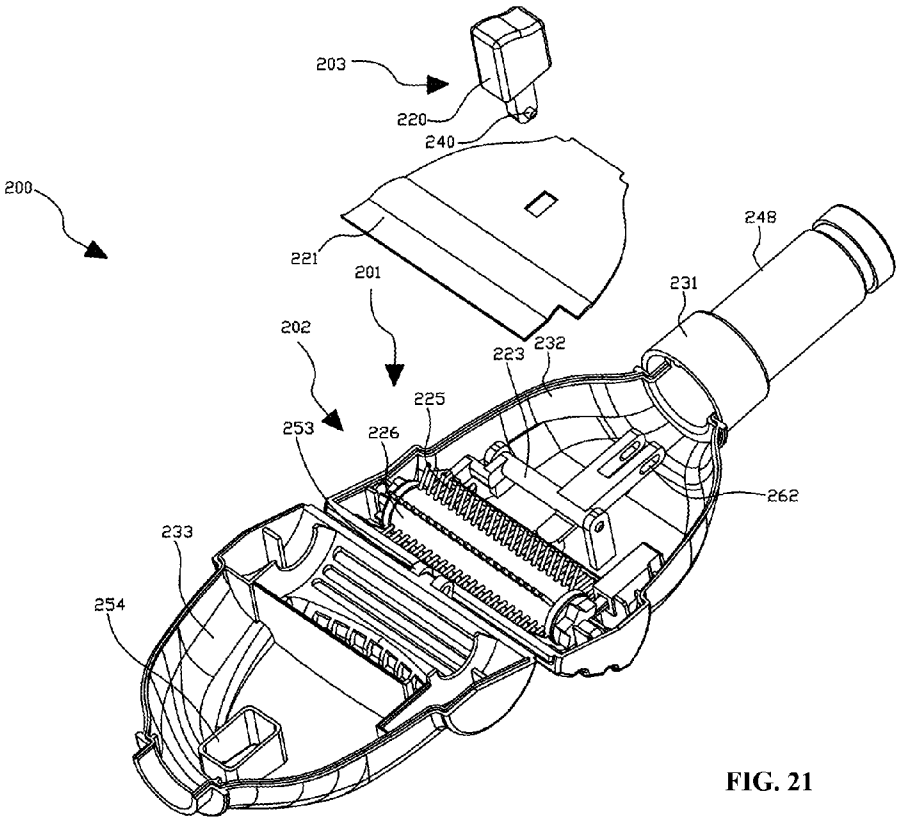


FIG. 21

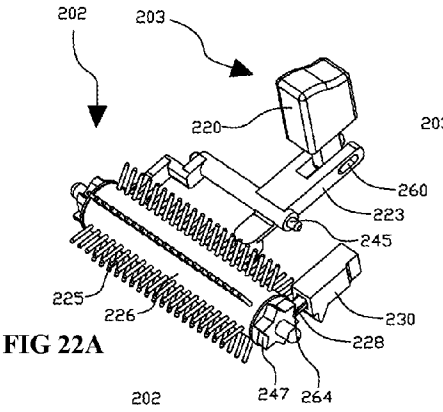


FIG 22A

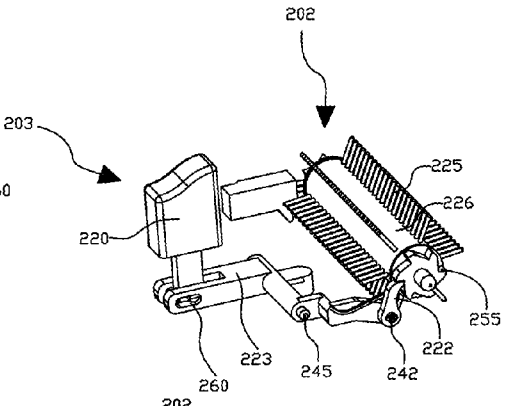


FIG. 22B

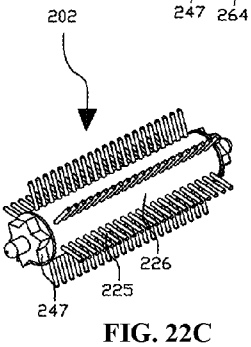


FIG. 22C

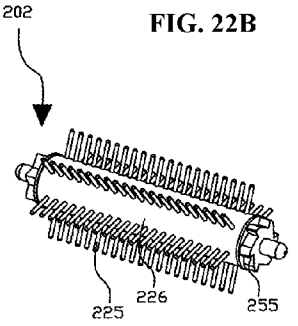


FIG. 22D

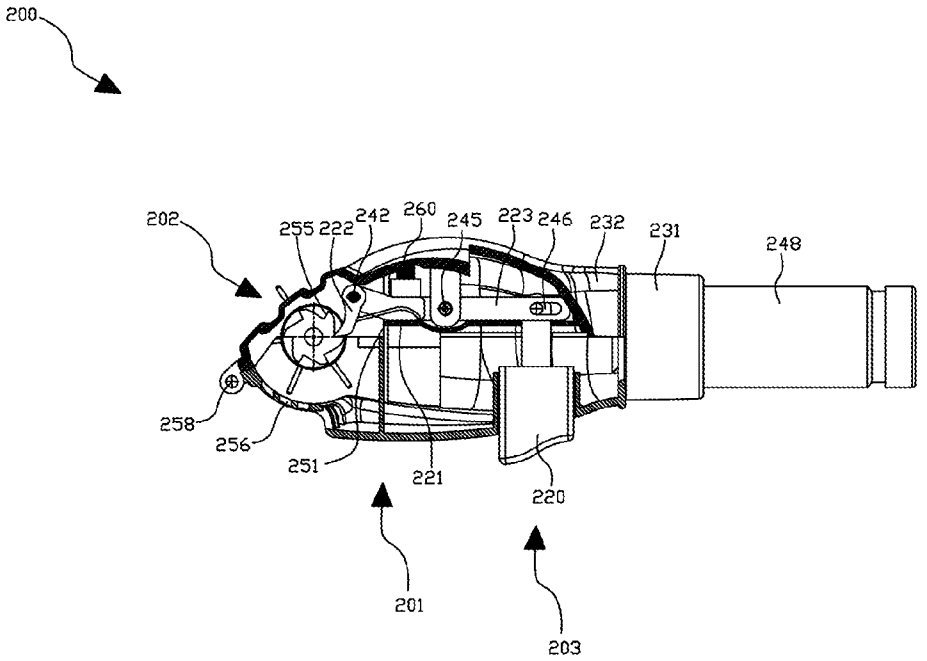

200
202
255
222
242
260
245
223
246
232
231
248
258
256
251
221
220
201
203

FIG. 23

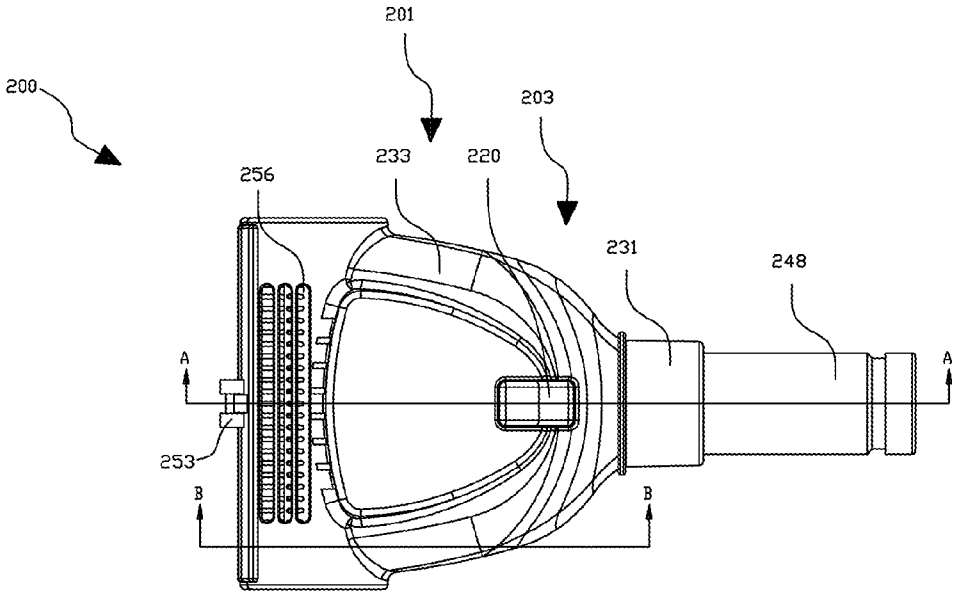

200
201
203
233
220
256
231
248
A
A
253
B
B

FIG. 24

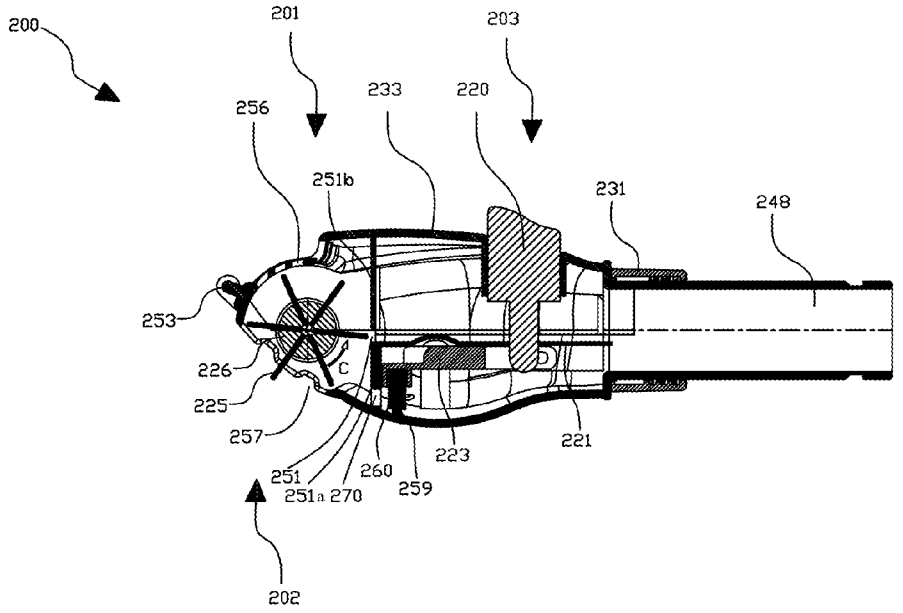

200
201
203
233
220
256
251b
231
248
253
226
225
257
251
251a
270
260
259
223
221
202

FIG. 25

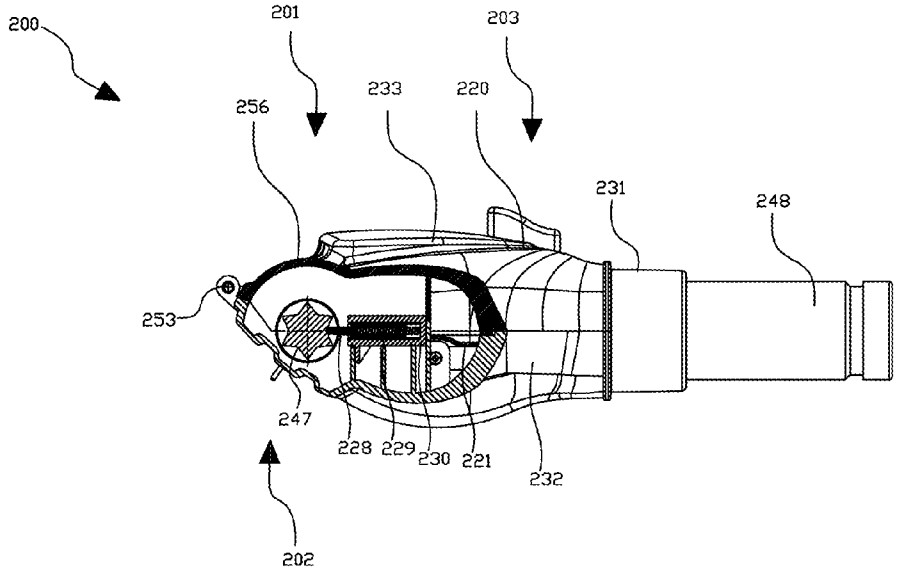

200
201
203
233
220
256
231
248
253
247
228
229
230
221
232
202

FIG. 26

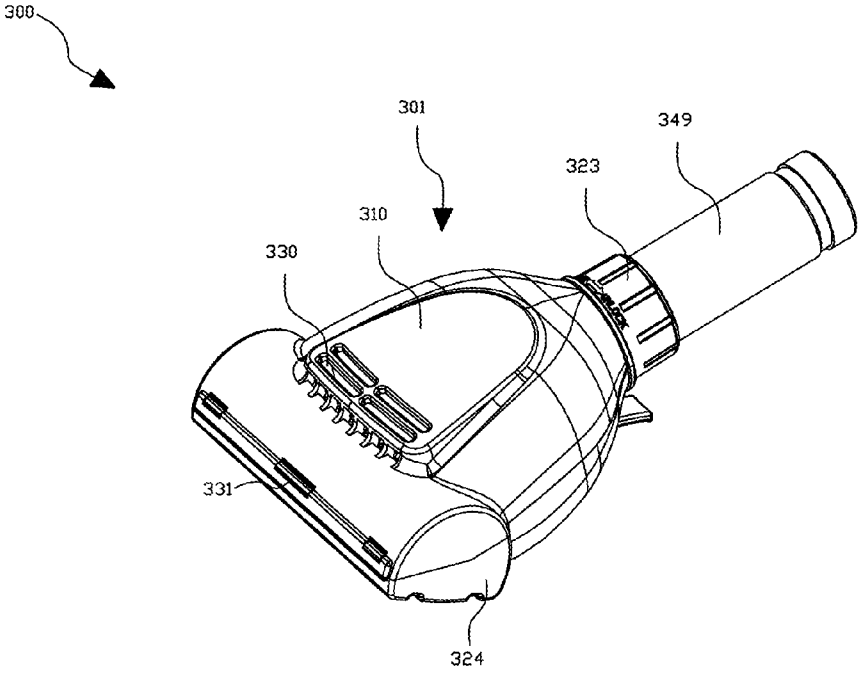

300
301
349
323
310
330
331
324

FIG. 27

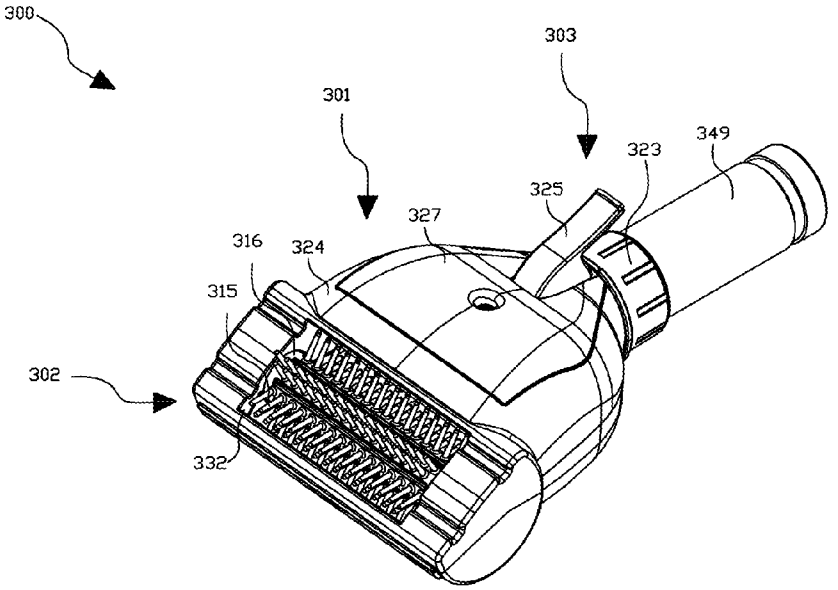

300
303
301
349
323
325
327
316
324
315
302
332

FIG. 28

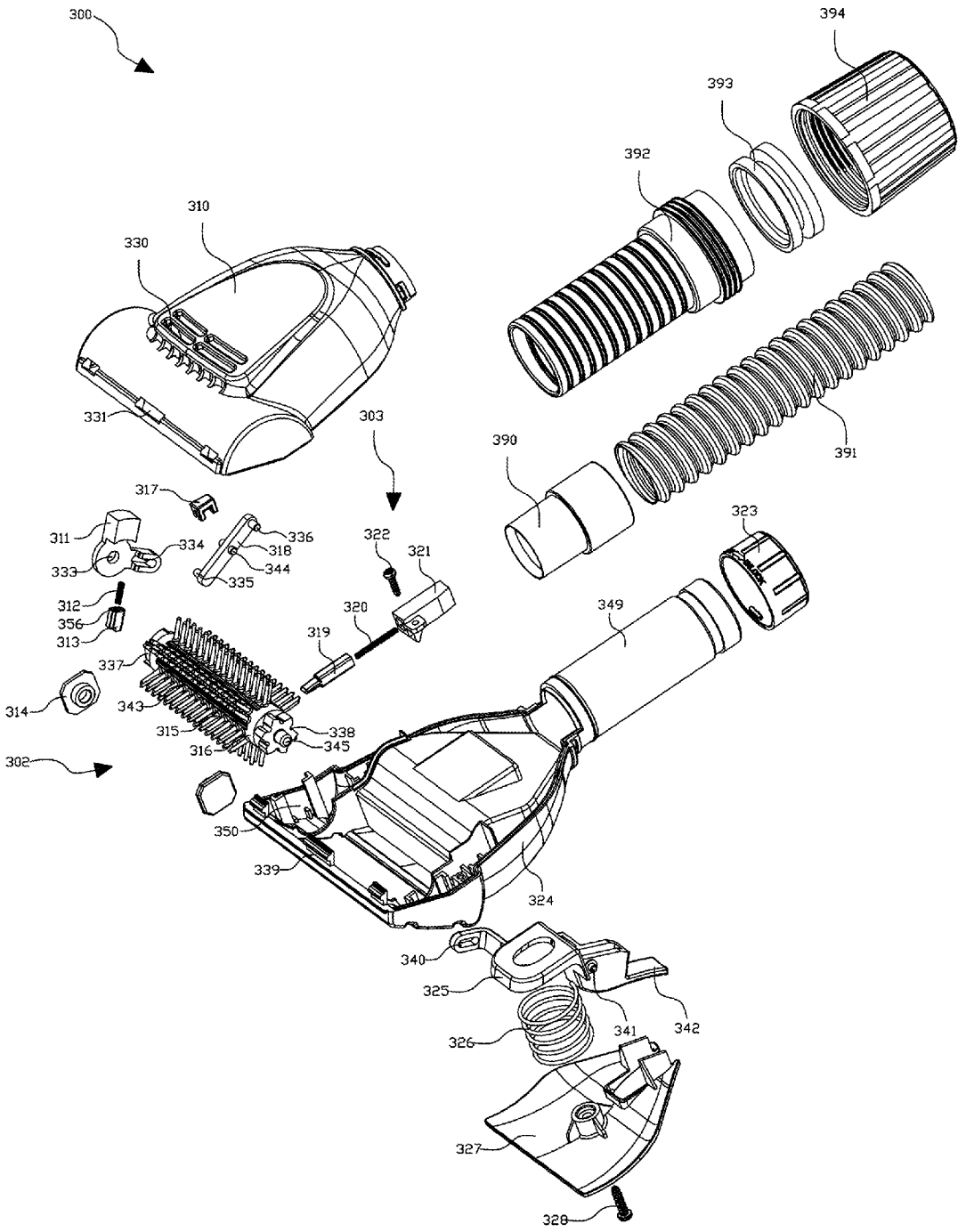

300
394
393
392
310
330
331
303
390
391
317
323
311
334
336
322
321
318
333
344
335
312
320
349
356
319
313
337
314
343
315
338
316
345
302
350
339
324
340
325
341
342
326
327
328

FIG. 29

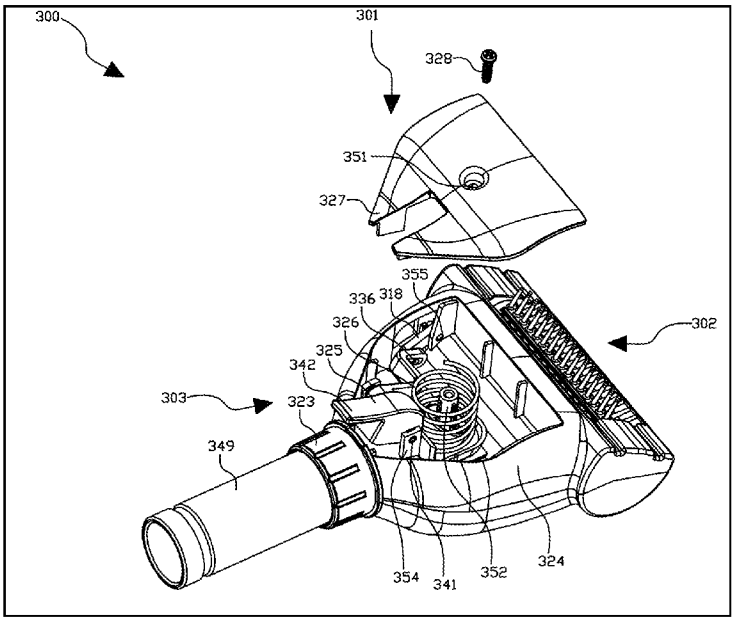


FIG. 30

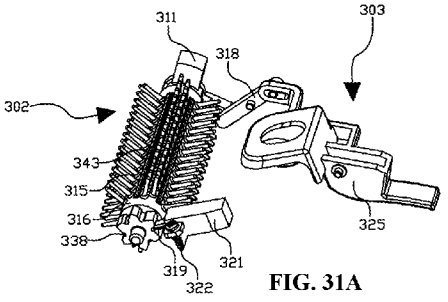


FIG. 31A

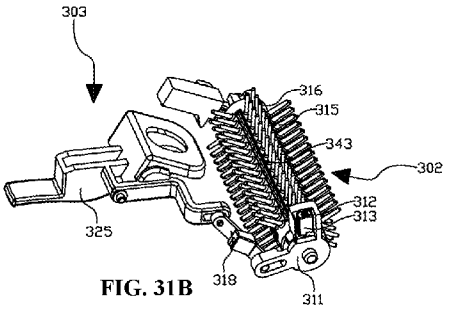


FIG. 31B

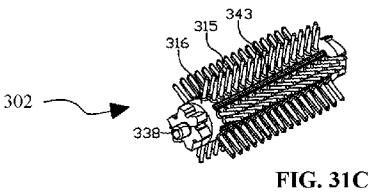


FIG. 31C

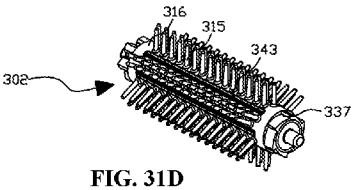


FIG. 31D

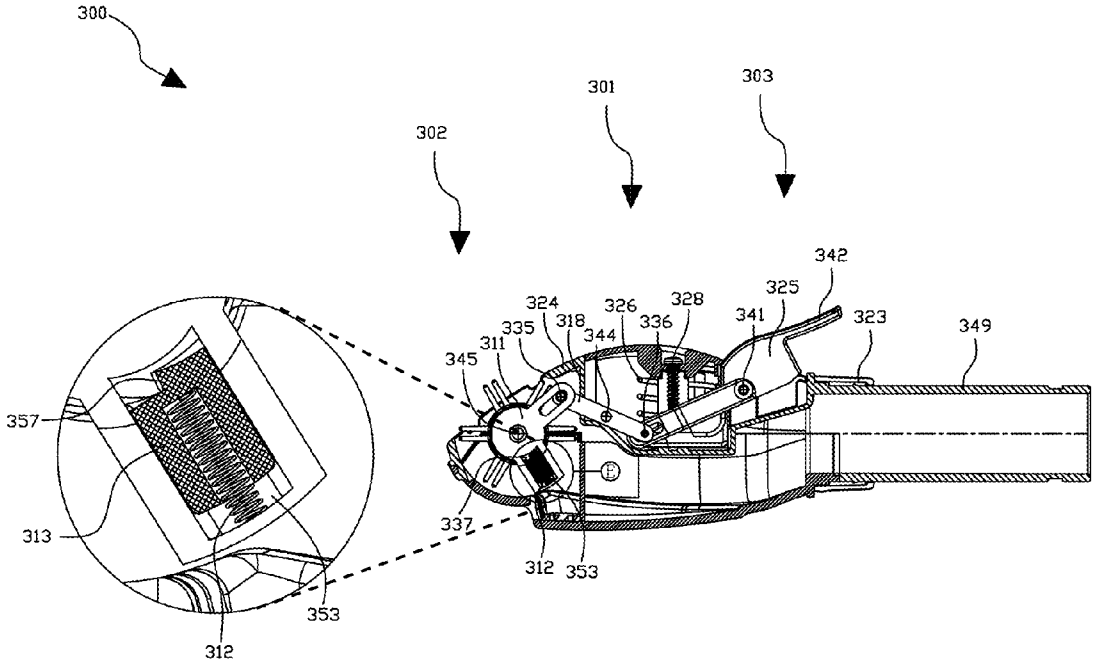

300
301
302
303
342
325
324
326
328
318
336
341
323
349
335
311
344
345
357
313
337
312
353
353
312

FIG. 32

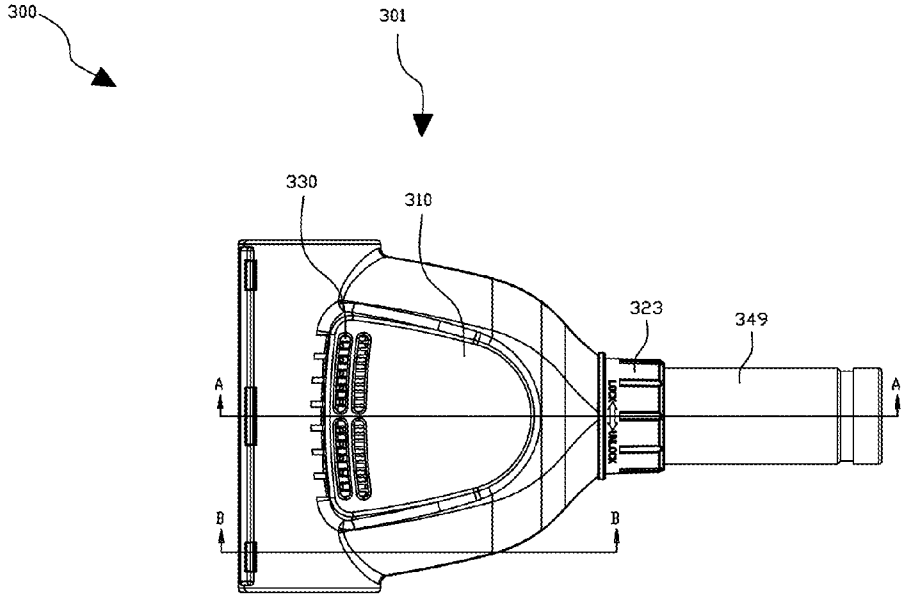

300
301
330
310
323
349
A
A
B
B

FIG. 33

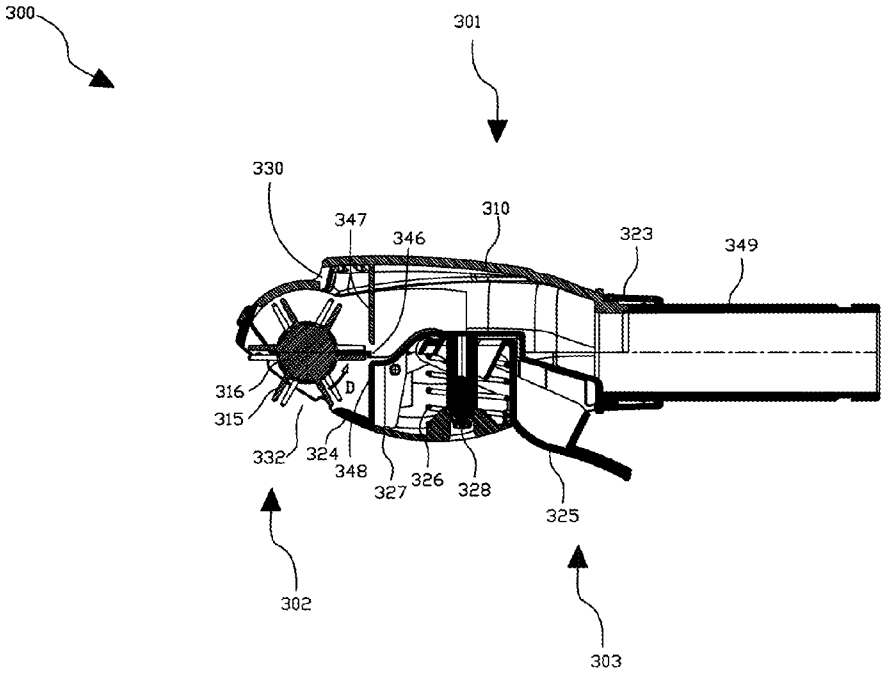

300
301
330
347
346
310
323
349
316
315
332
324
348
327
326
328
325
302
303

FIG. 34

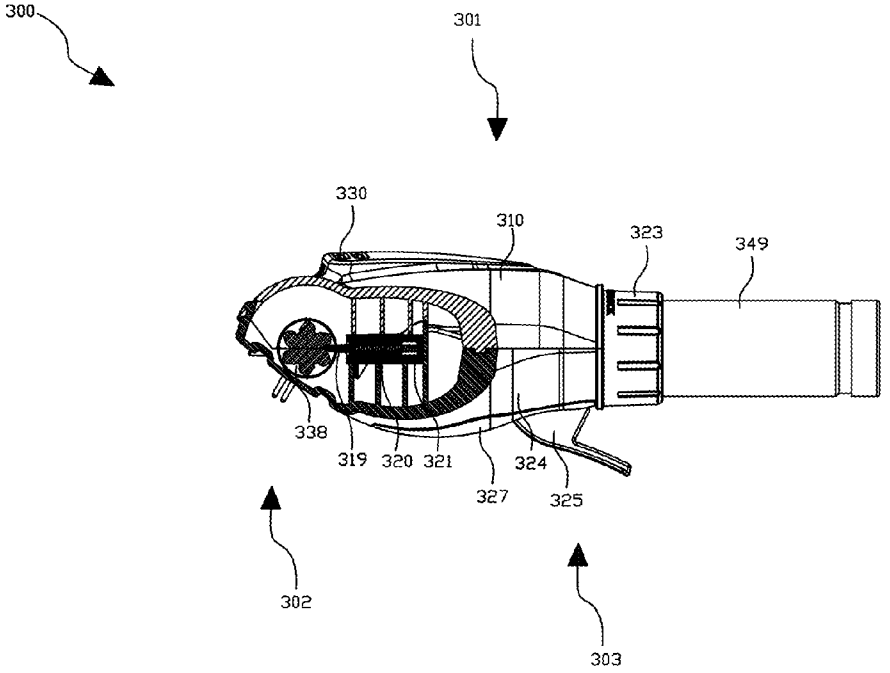

300
301
330
310
323
349
338
319
320
321
327
324
325
302
303

FIG. 35

PET GROOMER AND VACUUM CLEANER

RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 13/761,393 filed Feb. 7, 2013, which claims priority from CN201210166508.X filed May 25, 2012 and CN201210282678.4 filed Aug. 9, 2012, each of which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

The invention relates to a pet groomer and a vacuum cleaner includes the pet groomer.

BACKGROUND OF THE INVENTION

Generally, pet owners use brushes to comb their pet. The loose hair that combed from pets are comparatively thin and broken, easily flying with the wind, and can contain allergens or various bacteria and throw threats to or even destroy health of people, especially to children and sensitive people. Loose hair combed down by traditional brush can scatter in the air or on the ground or twined in comb teeth, user has to clear twined hair by hand from comb teeth. In the process, user is exposed to or even harmed by bacteria and/or allergen contained in pet hair. Besides, most comb teeth are relatively sharp and intensively arranged, so user may get hurt when clearing twined hair manually.

In order to solve the problems above, U.S. Pat. No. 6,681,775 (Wang) discloses a pet brush comprised of a front plate and a base plate, lots of holes corresponding to comb teeth are set in the front plate, with many comb teeth planted on base plate which extends outside of corresponding holes in the front plate, when it is necessary to comb a pet, user operate controlling key to extend comb teeth out, then the comb teeth withdraw from corresponding holes by operating the controlling key after pet hair combed, combed hair will be stripped off comb teeth by the front plate and then dumped into trash can. Since combed loose hair can scatter in all directions when falling into trash can from comb teeth, allergens and/or bacteria may spread to pollute environment, and besides, user has to operate the controlling key in every combing process to strip off hair in comb teeth and holding the pet brush, put it into the trash can. It is inconvenience and labor waste.

Based on the above, CN201010189748.2 discloses a vacuum cleaner attachment. The attachment can be connected with vacuum cleaning equipment through a pipe, the external wall of the pipe serves as an operating handle, the overlying front plate and base plate are at the other end of the pipe, many bristle-type comb teeth are planted in the base plate, the front plate has many holes and an air inlet connected with the main suction channel of vacuum cleaner, and comb teeth in the base plate extend or withdraw through holes in the front plate. A controlling key with a spring is set near the pipe handle, user operate the controlling key to move towards the pipe handle direction, to drive comb teeth to extend outwards through the holes on front plate and enter the combing status. After pet hair transferred to comb teeth, user relaxes finger to let comb teeth withdraw, meanwhile the airflow speed at the air inlet suction hole becomes higher to vacuum loose hair after it is stripped off comb teeth by the front plate. Since loose hair firstly stripped from comb teeth can fall down freely due to insufficient suction force of the main suction channel, and as the air intake direction is vertical to the front plate scattered with stripped hair, the pet hair which is at the rim of the front plate can't be completely vacuumed away easily. Furthermore, in order to avoid excessive suction force which affects comfort of pet, the suction force at the air intake hole cannot be too strong. In practice, hair stripped off from rim comb teeth can stuck on front plate after comb teeth withdrawn, user must extend and withdraw comb teeth repeatedly to move residual hair into suction hole completely, sometimes still have to use fingers to help in the final. This can obviously increase the chance of hair and allergen spreading to cause secondary pollution. Therefore, the risk that furs and allergens spread to cause secondary pollution can be increased. If there have fleas hide inside the hair combed down, they may be exposed in air on the front plate in the end of each incomplete stripping/vacuuming cycle and get chance to jump around. Many stripping and vacuuming cycles needed to comb a pet, incomplete vacuuming can multiply the chance of flea spreading. Moreover, the controlling key of the tool should be pressed to extend comb teeth outwards, and user should press the controlling key constantly during the combing process, it can be tiring for use. As the length of comb teeth is fixed, it is uneasy to control the length of comb teeth extended outside of the front plate to fit different pet hair length. Shorter extended teeth cannot comb deep enough for pets with thick hair, and longer extended teeth can hurt pets with thin hair. In order to maximize effective suction at the air inlet hole in the front plate, the tool welds different components together which makes it very difficult for consumer to replace comb teeth. If one or more comb teeth damaged, consumer will have to buy a new product. Besides, it is unavoidable that some pet hair drop in the gap of welded parts in use, it is hard for user to clean.

BRIEF SUMMARY OF THE INVENTION

Targeting at the problems above, the present invention provides a pet groomer which is used in conjunction with the suction hose of a vacuum cleaner, comprising: a substance body which has a suction channel that is used to be connected with the suction hose and has at least one air intake which transmits air to the suction channel; a combing assembly which is used to comb pet hair; and a driving assembly which drives said combing assembly so as to make comb teeth in combing assembly to move to the air intake from a comb position.

As the embodiment 1 of the invention, the pet groomer can also has the following features: the substance body also has a hollow front section which is placed outside of the air intake and the hollow front section has a comb use opening; the combing assembly is consisted of a rotating body and a plurality of groups of the comb teeth distributed in the axial direction of the rotating body; The rotating body is installed inside of the hollow front section, at least one group of the comb teeth extends outwards from the comb use opening to comb pet hair, and a rotation accepting assembly is set at one end of the rotating body; the driving assembly is formed from a knob drive assembly, the knob drive assembly has a drive unit and a knob in conjunction with the drive unit, the drive unit penetrates through aside wall of the hollow front section inosculating with the rotation accepting assembly, and the knob is exposed on external surface of the hollow front section.

Further, the pet groomer of the invention in embodiment 1 can also has the following features: the driving assembly also has a rotation angle locating section which locates the rotation angle of the rotating body.

Further, the pet groomer of the invention in embodiment 1 can also has the following features: the rotation angle locating section has a 3-tooth positioning block which surrounds the rotation accepting assembly, and ensures the knob drives the rotating body to rotate by 120° every time; the comb teeth has three groups, the circular pitch between two neighbor groups is 120°, and the air intake is set at the position 120° rotated from the comb position.

Further, the pet groomer of the invention in embodiment 1 can also has a position limiting unit, a ratchet wheel is set at the other end of the rotating body, the position limiting unit is consisted of the ratchet wheel and a position limiting plate which is meshed with the ratchet wheel, and when the rotating body rotates by the said rotation angle, the position limiting plate and the ratchet wheel are meshed to prevent the comb teeth from leaving the comb position.

Further, the pet groomer of the invention in embodiment 1 can also has the following features: the hollow front section also has an air leakage opening which may prevents excessive air force in the comb use opening from affecting comfort level of pet when combed.

Besides, the pet groomer of the invention in embodiment 2 can also has the following features: the substance body also has a hollow front section which is placed outside of the air intake, and the hollow front section has a comb use opening; the combing assembly is consisted of a rotating body and a plurality of groups of the comb teeth distributed in the axial direction of the rotating body. The rotating body is installed inside of the hollow front section, at least one group of the comb teeth extends outwards from the comb use opening to comb pet hair, and a rotation accepting assembly is set at one end of the rotating body; the driving assembly is formed from a lever drive assembly which has a connecting rod driving unit and a lever connected with the connecting rod driving unit, and the connecting rod driving unit is meshed with the rotation accepting assembly.

Further, the pet groomer of the invention in embodiment 2 can also has the following features: the rotation accepting assembly is a ratchet wheel, the connecting rod driving unit has a driving pawl meshed with the ratchet wheel, and the ratchet wheel and the driving pawl constitute a rotation angle locating section which regulates the rotation angle of the rotating body.

Further, the pet groomer of the invention in embodiment 2 can also has the following features: the pet groomer also includes a position limiting pawl, a 6-tooth position limiting wheel is also set at the other end of the rotating body, the position limiting pawl and the 6-tooth position limiting wheel constitute a position limiting unit to ensure that the rotating body rotates by the said rotation angle.

Further, the pet groomer of the invention in embodiment 2 can also has the following features: the ratchet wheel is a 6-tooth ratchet wheel, and when the lever is activated for one time, the rotating body will be driven to rotate by 60'; the comb teeth are in six groups, the circular pitch between two neighbor groups is 60°, and the air intake is set at the place 60° rotated from the comb position.

Further, the pet groomer of the invention in embodiment 2 can also has the following features: the substance body also has an actuator container which is formed along and separated apart from the suction channel, the actuator container is adjacent to the hollow front section and used to contain the driving assembly, and the lever is exposed outside of the actuator container.

Further, the pet groomer of the invention in embodiment 2 can also has the following features: the hollow front section also has an air leakage opening which prevents excessive air force in the comb use opening from affecting comfort level of pet when combed.

Besides, the pet groomer of the invention in embodiment 3 can also has the following features: the substance body has two air intakes as the primary air intake and secondary air intake and a hollow front section which is placed outside of the two air intakes, and the hollow front section has a comb use opening; the combing assembly is consisted of a rotating body and a plurality of groups of the comb teeth distributed in the axial direction of the rotating body. The rotating body is installed inside of the hollow front section, at least one group of the comb teeth extends outwards from the comb use opening to comb pet hair, and a rotation accepting assembly is set at one end of the rotating body; the driving assembly is formed from a press-button drive assembly which has a connecting rod driving unit and a press-button which is connected with the connecting rod driving unit, and the connecting rod driving unit is meshed with the rotation accepting assembly. The comb teeth which have combed pet hair are firstly rotated to the primary air intake and then the secondary air intake in further activation.

Further, the pet groomer of the invention in embodiment 3 can also has the following features: the rotation accepting assembly is a ratchet wheel, the connecting rod driving unit has a driving pawl which is meshed with the ratchet wheel, and the ratchet wheel and the driving pawl constitute a rotation angle locating section which regulates the rotation angle of the rotating body.

Further, the pet groomer of the invention in embodiment 3 can also has the following features: the pet groomer also includes a position limiting pawl, a 6-tooth position limiting wheel is set at the other end of the rotating body, and the position limiting pawl and the 6-tooth position limiting wheel constitute a position limiting unit which ensures that the rotating body rotates by the said rotation angle.

Further, the pet groomer of the invention in embodiment 3 can also has the following features: the ratchet wheel has 6 teeth, and when the press-button is pressed for one time, the rotating body will be driven to rotate by 60°, the comb teeth are in six groups, the circular pitch between two neighbor groups is 60°, the primary air intake is set at the position 60° rotated from the comb position, and the secondary air intake is set at the position 120° rotated from the comb position.

Further, the pet groomer of the invention in embodiment 3 can also has the following features: the substance body also has an actuator container which is formed along and separated apart from the suction channel, the actuator container is adjacent to the hollow front section which is used to contain the driving assembly, and the press-button is exposed outside of the actuator container.

Further, the pet groomer of the invention in embodiment 3 can also has the following features: the substance body also has an air leakage opening which prevents excessive air force in the comb use opening from affecting comfort level of pet when combed.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the combing assembly is constituted of a rotating body and a plurality of groups of the comb teeth distributed in the axial direction of the rotating body. A ratchet wheel with more than one tooth space is set on one end of the rotating body. The driving assembly is constituted of a cam assembly and a connecting rod driving assembly; the cam assembly has a cam coaxial with the rotating body, a cam track which is integrated with the cam, and a driving pawl unit which is set on the cam; the driving pawl unit has a driving pawl which is meshed with

the tooth space, and the connecting rod driving assembly is engaged with the cam track and drives the cam track to move, so the driving pawl can mesh with the tooth space.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the driving pawl unit has a driving pawl chamber which is integrated with the cam and used to contain the driving pawl, and has a spring with one end supported by the internal surface of the driving pawl chamber; the connecting rod driving assembly is engaged with the cam track to drive the cam track to move towards the direction opposite to the rotation direction of said rotating body, so the driving pawl acts on the surface of the ratchet wheel under the elastic force of the spring, presses on the surface of the ratchet wheel flexibly in the radial direction of the cam, moves from one tooth space to next one, and meshes with the next one.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: a spring retaining slot is set at one end of the driving pawl, the other end of the spring is in the spring retaining slot, and the driving pawl always presses on the surface of the ratchet wheel in the radial direction of the cam under the elastic force of the spring, and moves from one tooth space to next one.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the substance body also has a hollow front section which is placed outside of the air intake, the hollow front section has a comb use opening, the rotating body is installed inside of the hollow front section, and the comb teeth which is rotated to the comb position extends outside of the comb use opening to comb the pet hair.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the cam assembly and the ratchet wheel constitute a rotation angle locating section to regulate the rotation angle of the rotating body.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the ratchet wheel is a 6-tooth ratchet wheel, the rotation angle is 60° every time, and at least one air intake is set at the position integral multiples of 60° rotated from the comb position.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the comb teeth are in six groups, the circular pitch between two neighbor groups is 60°, every group of comb teeth has two rows of stagger arrangement, and the air intake is set in the position rotated by 120° from the comb position.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the comb teeth are in three groups, the circular pitch between two neighbor groups is 120°, the air intake is set at the position rotated by 120° from the comb position, when the first group of the comb teeth extends outside of the comb use opening, the rotating body rotates for two times, and when the second group of the comb teeth is rotated to the comb position, the first group of the comb teeth is rotated to the position right against the air intake; when the rotating body rotates for one time, the comb teeth is rotated to the position with 60° circular pitch from the comb position and therefore withdrawn in the hollow front section to protect the comb teeth.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: a position limiting pawl is also included, a 6-tooth position limiting wheel is also set at the other end of the rotating body, and the position limiting pawl and the position limiting wheel constitute a position limiting unit which ensures that the rotating body rotates by the said rotation angle.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the substance body also has a flexible hose which is connected with the suction channel and an universal adaptor to be connected with the suction hose, and the universal adaptor regulates its inner diameter flexibly to ensure tight connection with the suction hose of different external diameters.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: an operating and prompting unit is also included which sends corresponding information according to the fact whether the comb teeth are at the comb position or not and informs the user the status of the pet groomer; when no comb teeth are in the comb position, i.e. the pet groomer is under the status of protecting the comb teeth, the operating and prompting unit sends corresponding signals to inform the user it is protecting the comb teeth status, and then drives the connecting rod driving assembly, so a group of the comb teeth will extend outside of the comb use opening; when a group of comb teeth in the comb position is at the comb use opening, i.e. the pet groomer is under combing status, the operating and prompting unit sends corresponding signals to inform the user the combing status available to comb pet hair; if the comb teeth need to be withdrawn and hidden in the pet groomer, the connecting rod driving assembly should be driven.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the substance body also has an actuator container which is formed along and separated apart from the suction channel, the actuator container is adjacent to the hollow front section and used to contain the driving assembly. The connecting rod driving assembly has a press-button or a lever drive assembly which is exposed to the outside of the actuator container for selection.

Further, the pet groomer of the invention in embodiment 4 can also has the following features: the substance body also has at least one air leakage opening which prevents excessive air force in the comb use opening from affecting comfort level of pet when combed.

Further, according to the present invention, there is provided a vacuum cleaner, comprising:

a suction hose; and

a pet groomer to be used in conjunction with the suction hose, wherein the pet groomer is described above.

The above and other objects and features of the present invention will become apparent from the following detailed description and the appended claims with reference to the accompanying drawings.

The pet groomer and related vacuum cleaner system with said groomer provided by present invention drives the combing assembly through the driving assembly, to move pet hair combed down from pet body to air intake position so as to be vacuumed away directly, avoiding the intermediate action of stripping off hair from comb teeth or similar actions, so no loose hair can fall off from pet body in grooming to pollute environment or to transmit allergen material.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary, as well as the following detailed description of the invention, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there are shown in the drawings embodiments which are presently preferred. It

should be understood, however, that the invention is not limited to the precise arrangements and instrumentalities shown.

In the drawings:

FIG. **1** is a side perspective view of the pet groomer in embodiment 1;

FIG. **2** is a perspective view of the pet groomer in embodiment 1, from bottom side;

FIG. **3** is an exploded view of the pet groomer in embodiment 1;

FIG. **4** is a perspective view of the pet groomer in embodiment 1, from bottom side;

FIGS. **5**A-D are structural illustrations of combing assembly of the pet groomer in embodiment 1;

FIG. **6** is a top view of the pet groomer in embodiment 1;

FIG. **7** is an A-A section view of FIG. **6**;

FIG. **8** is a B-B section view of FIG. **6**;

FIG. **9** is a side perspective view of the pet groomer in embodiment 2;

FIG. **10** is a perspective view of the pet groomer in embodiment 2, from bottom side;

FIG. **11** is an exploded view of the pet groomer in embodiment 2;

FIG. **12** is a bottom exploded view of the pet groomer in embodiment 2;

FIGS. **13**A-D are structural illustrations of the combing assembly of the pet groomer in embodiment 2;

FIG. **14** is an inverted side section view of the pet groomer in embodiment 2;

FIG. **15** is a top view of the pet groomer in embodiment 2;

FIG. **16** is an A-A section view of FIG. **15**;

FIG. **17** is a B-B section view of FIG. **15**;

FIG. **18** is a side perspective view of the pet groomer in embodiment 3;

FIG. **19** is a perspective view of the pet groomer in embodiment 3, from bottom side;

FIG. **20** is an exploded view of the pet groomer in embodiment 3;

FIG. **21** is a semi-exploded view of the pet groomer in embodiment 3;

FIGS. **22**A-D are structural illustrations of the combing assembly of the pet groomer in embodiment 3;

FIG. **23** is an inverted side section view of the pet groomer in embodiment 3.

FIG. **24** is a top view of the pet groomer in embodiment 3;

FIG. **25** is an A-A section view of FIG. **24**;

FIG. **26** is a B-B section view of FIG. **24**;

FIG. **27** is a side perspective view of the pet groomer in embodiment 4;

FIG. **28** is a perspective view of the pet groomer in embodiment 4, from bottom side;

FIG. **29** is an exploded view of the pet groomer in embodiment 4;

FIG. **30** is a bottom exploded view of the pet groomer in embodiment 4;

FIGS. **31**A-D are structural illustrations of the combing assembly of the pet groomer in embodiment 4;

FIG. **32** is an inverted side section view of the pet groomer in embodiment 4;

FIG. **33** is a top view of the pet groomer in embodiment 4;

FIG. **34** is an A-A section view of FIG. **33**; and

FIG. **35** is a B-B section view of FIG. **33**.

DETAILED DESCRIPTION OF THE INVENTION

Embodiments of the invention will be described in details herein below with reference to the drawings.

Embodiment 1

FIG. **1** is a side perspective view of a pet groomer in embodiment 1; FIG. **2** is a perspective view of the pet groomer in embodiment 1 from bottom side; FIG. **3** is an exploded view of the pet groomer in embodiment 1; FIG. **4** is a perspective view of the pet groomer in embodiment 1 from bottom side; FIG. **6** is a top view of the pet groomer in embodiment 1; FIG. **7** is an A-A section view of FIG. **6** of the pet groomer in the embodiment; as shown by FIG. **1**, FIG. **2**, FIG. **3**, FIG. **4**, FIG. **6** and FIG. **7**, the pet groomer **10** to be used together with the suction hose of a vacuum cleaner includes a substance body **11**, a combing assembly **12** and a driving assembly **13**.

The substance body **11** has an upper covering unit **20** and a lower covering unit **28**. The lower covering unit **28** is constituted of the front section and rear section and a suction channel **43** is set at the rear section to be connected with the suction hose of vacuum cleaner. The external wall of suction channel **43** also serves as a handle for users to operate and use the pet groomer **10**; half circles structure **46** and **47** are set at two side ends of the front section respectively and form circles together with the upper covering unit **20** for mounting the combing assembly **12**. The front section also has a buckle **45**, a slot **53** is set at the front section of the upper covering unit **20**, and the slot **53** and the buckle **45** are fastened so that the upper covering unit **20** and the lower covering unit **28** are tightly combined together.

A clamp ring **27** is also set in the substance body **11** for combining the half circle structure at the rear end of the upper covering unit **20** with the corresponding half circle at the middle of the lower covering unit **28** to clamp the upper covering unit **20** with the lower covering unit **28** tightly. The clamp ring is detachable. When it is necessary to replace the combing assembly or clean the parts between the upper covering unit **20** and lower covering unit **28**, demount the clamp ring **27** to demount the upper covering unit **20** and the lower covering unit **28**, and obviously the combing assembly mounted between the upper covering unit **20** and the lower covering unit **28** is replaceable.

After the upper covering unit **20** is combined with the lower covering unit **28**, the baffle **44***b* in the upper covering unit **20** forms an air intake **44** (See FIG. **7**) to transmit air into the suction channel **43** together with the baffle **44***a* in the lower covering unit **28**. The best preference for the length of air intake **44** is to be longer than the contour length of any group of comb teeth **21** distributed on rotating body **22**. A hollow front section is placed outside of the air intake **44**, and a comb use opening **50** and an air leakage opening **40** are set in the hollow front section.

FIGS. **5**A-D are structural illustrations of the combing assembly of the pet groomer in embodiment 1, of which views a, b, c and d are structural illustrations of the combing assembly in different directions. As shown by FIGS. **5**A-D, the combing assembly **12** is comprised of a rotating body **22** and three groups of comb teeth **21** arranged in axial direction on the rotating body **22**. Every group includes two rows of comb teeth **21**, and the interval of two adjacent groups of comb teeth **21** is 120°, and one group of comb teeth **21**

extends outside of the comb use opening **50** to comb pet hair. The air intake **44** is set at the position rotated by 120° from comb position along direction A in FIG. **7**.

As the best preference for the arrangement of comb teeth **21** on rotating body **22**, for any group of comb teeth **21**, when they are located opposite to the air intake **44**, their orthogonal projection against air intake **44** should not fall beyond the contour of air intake **44**. The recommended length of comb tooth **21** is equivalent to the thickness of pet hair to be combed

Felts **23** are mounted at two ends of the rotating body **22**, so the rotating body **22** is mounted in the circle **46** between the upper covering unit **20** and lower covering unit **28** to make sure that the rotating body **22** rotates around the axis and the rotating body **22** is tightly combined with the upper covering unit **20** and lower covering unit **28** to avoid furs and other sundries from flying into two side ends. Obviously the rotating body **22** is inside of the hollow front section.

A driven groove **42** (i.e. rotation accepting assembly) and a 6-tooth positioning block **41** around the driven groove **42** for regulating the rotation angle of the rotating body **22** as 120° are set at one end of the rotating body **22**.

The 6-tooth positioning block **41** and the positioning gear unit constitute a positioning unit, and the positioning gear unit is comprised of a positioning gear **24** to mesh with the 6-tooth positioning block **41**, a guide holder **26** fixed between the upper covering unit **20** and the lower covering unit **28**, and a spring **25** to connect the two above. The end of the positioning gear **24** connected with the spring **25** is inserted into the guide holder **26** so that the positioning gear is able to flexibly extend in the guide holder **26** under the action of the spring **25**. When the rotating body **22** rotates by 120°, the positioning gear **24** is meshed with the 6-tooth positioning block **41** to make sure that the rotation angle of the rotating body must be integral multiples of 120°.

The pet groomer **10** also has a position limiting plate **31**, a ratchet wheel **52** meshed with the position limiting plate **31** is set at the other end of the rotating body **22**, the ratchet wheel **52** and the position limiting plate **31** constitute a position limiting unit, so that the ratchet wheel **52** and the position limiting plate **31** are meshed every time after the rotating body **22** rotates to prevent the rotating body **22** from rotating reversely in combing.

The driving unit **13** is a knob with a rib **48**, rib **48** passes through the side end of the hollow front section and meshes with the driven groove **42**, so when the knob **29** is turned, the moment is transferred to the rotating body **22** from rib **48** to make the comb teeth **21** rotate around the axis. Comb teeth **21** can fix in the place right against air intake **44** and ensure every piece of comb teeth **21** in this group points to air intake **44** and falls inside the air stream into the air intake **44**.

When the pet groomer is used to comb pet hair, firstly choose the rotating body **22** with corresponding length of comb teeth **21** to mount in the hollow front section according to different pet hair length, so to avoid scratch on pet skin owing to unsuitable lengths of comb teeth in the combing process. Then connect the pet groomer with a vacuum cleaner, and turn on the vacuum cleaner. Then the comb use opening **50** and the air leakage opening **40** transmit airflows to the air intake **44** at the same time, and the airflow enters into vacuum cleaner through the suction channel **43**. Then user holds the external wall of the suction channel **43** as handle to comb pets. In the combing process, the pet's body blocks the comb use opening **50**, the airflow from the air leakage opening **40** to the air intake **44** reduces the suction force at the comb use opening **50** and effectively avoiding excessive suction that affects comfort of pets. After a certain amount of hair is accumulated on the comb teeth, turn the knob **29** to make a new group of comb teeth **21** to the comb position, so user could continue to comb pets with the new group of comb teeth. The two rows of comb teeth **21** just combed hair are rotated by 120° along direction A (See FIG. **7**), which is just fixed at the position opposite to the air intake **44**, to make sure that every piece of comb teeth in the group of comb teeth **21** points to the middle of the air intake **44**, and sufficient suction force along the comb teeth extending direction will vacuum hair from the comb teeth **21** into the air intake **44**, no need external force to strip hair off comb teeth in advance. Because suction force is on the comb position in the whole process, pet hair will not drop down in the whole process.

The best total sectional area of the air leakage opening **40** is 1.2 times of total sectional area of the air intake **44**, and the best total sectional area of the air intake is equivalent to the sectional area of the suction hose of the vacuum cleaner. The best airflow at the air intake is equivalent to the actual airflow of the suction hose of a vacuum cleaner, i.e. no air leaking device is between the air intake and the suction hose of the vacuum cleaner.

Function and Effects of Embodiment 1

In summary, the pet groomer **10** in the embodiment has the knob **29** to drive the rotating body **22**, so pet hair combed are transferred to the air intake **44** and vacuumed into cleaner. No pet hair drops down in the combing process, thus not causing environmental pollution and avoiding allergen spreading. Besides, the substance body is detachable and easy for internal structure cleaning; the rotating body is replaceable, so user can choose suitable comb teeth length for his pet groomer according to different pet hair to improve the comfort level of pets in the combing process and avoid hurting pets, since pet hair is transferred to air intake through knob rotation, even hair wound in comb teeth can also be vacuumed into the air intake along the comb teeth extending direction and they will not scatter, and moreover, intermediate actions like stripping off hair from comb teeth or similar are saved. As a result the pet groomer **10** has the following features: simple structure, convenient use, labor saving, not tiring for use and no threaten to users health.

The clamp ring **27** in the embodiment can screw back and forth to mesh with the steps of the upper covering unit **20** and the lower covering unit **28** to ensure tight locking between the upper covering unit **20** and the lower covering unit **28**, clamp ring **27** can also lock with the upper covering unit **20** and the lower covering unit **28** through locking slot.

The comb teeth **21** in the embodiment are in three groups, it can also be in other integral group(s), and every group may has one or more rows; the quantity of the comb teeth **21** in every row is also subject to requirements, such as 20 pieces, 30 pieces, 40 pieces, 50 pieces and 60 pieces; the diameter of the comb teeth **21** is also subject to requirements, for example, ϕ0.3, ϕ0.5, ϕ0.6, ϕ0.8, ϕ1.0, ϕ1.2, ϕ1.5, etc. The material of the comb teeth **21** is subject to requirements like stainless steel 304, stainless steel 201, 45# plated steel, plastic PP, etc.; the top surface shape of the comb teeth **21** may be flat or others like ball-shape.

The comb teeth **21** in the embodiment may be directly fixed in the rotating body **22** or firstly connected with other carriers and then fixed in the rotating body **22**. For example, the comb teeth **21** may be firstly connected with a fixing base and then mounted on rotating body **22**. The comb teeth **21** may have a movable structure for convenient of repairing and replacement.

Embodiment 2

FIG. **9** is a side perspective view of the pet groomer in embodiment 2; FIG. **10** is a bottom perspective view of the

pet groomer in embodiment 2; FIG. **11** is an exploded view of the pet groomer in embodiment 2; FIG. **12** is a bottom exploded view of the pet groomer in embodiment 2; FIG. **14** is an inverted side section view of the pet groomer in embodiment 2; FIG. **15** is a top view of the pet groomer in embodiment 2; FIG. **16** is an A-A section view of FIG. **15**; FIG. **17** is a B-B section view of FIG. **15**. As shown by FIG. **9**, FIG. **10**, FIG. **11**, FIG. **12**, FIG. **14**, FIG. **15**, FIG. **16** and FIG. **17**, a pet groomer **100** to be used together with the suction hose of vacuum cleaner includes a substance body **101**, a combing assembly **102** and a driving assembly **103**.

The substance body **101** has an upper covering unit **110** and a lower covering unit **122**. The lower covering unit **122** is comprised of a front section and a rear section, a suction channel **144** is set at the rear end to be connected with the suction hose of vacuum cleaner, and the external wall of the suction channel **144** also serves as a handle for users to operate and use the pet groomer **100**; half circles **145** are set at two side ends of the front section respectively and form circles together with the upper covering unit **100** for mounting the combing assembly **102**. The front section also has a buckle **143**, a slot **151** is set at the front section of the upper covering unit **110**, and the slot **151** and the buckle **143** can be fastened together to lock tightly the upper covering unit **110** and the lower covering unit **122**. Substance body **101** (also named as main body) comprises two side walls, wherein the combing assembly **102** is fixed.

A clamp ring **123** also set in the substance body **101** for combining the half circle structure which is at the rear end of the upper covering unit **110** with the corresponding half circle which is at the middle of the lower covering unit **122** and clamp the upper covering unit **110** with the lower covering unit **122** tightly. The clamp ring **123** is detachable. When it is necessary to replace the combing assembly **102** or clean the parts between the upper covering unit **110** and lower covering unit **122**, demount the clamp ring **123** to demount the upper covering unit **110** and the lower covering unit **122**, and obviously the combing assembly mounted between the upper covering unit **110** and the lower covering unit **122** is replaceable.

After the upper covering unit **110** is combined with the lower covering unit **122**, the baffle in the upper covering unit **110** is tightly combined with the corresponding baffle in the lower covering unit **122**. An air transmission channel is set in the lower covering unit **122** and connected with the suction channel **144**. An air intake **142** is set accordingly in the front of the air transmission channel to transmit air into the air transmission channel. A hollow front section is placed outside of the air intake **142**, and a comb use opening **150** and an air leakage opening **130** are set in the hollow front section. The best preference of the length of air intake **142** is to be longer than the contour length of any group of comb teeth **111** distributed on rotating body **117**.

A back plate **124** is set at the bottom of the lower cover to cover the driving assembly, a screw hole **146** is set at the back plate **124**, a screw boss **152** corresponding to the screw hole **146** is set on the lower covering unit **122**, the back plate **124** is reliably connected with the lower covering unit **122** through the screw **125**, and the area between the back plate **124** and the lower cover of the air transmission channel (i.e. actuator container)-stores driving assembly **103**.

The driving assembly **103** is comprised of a lever drive assembly, which is consisted of a driving pawl **113**, a connecting rod **114**, and the lever **115** which is exposed outside of the actuator container and near the suction channel **144**. It is convenient for activating when user grasps the external wall of the suction channel **144** as handle. The connecting rod **114** has a positioning cylinder **134**, a motion transmission cylinder **135** connected with the lever **115**, and a motion transmission cylinder **133** connected with the driving pawl **113**. The positioning cylinder **134** is fixed in the positioning block **154** of the lower covering unit **122**. The motion transmission cylinder **133** activates the driving pawl **113**. The driving pawl **113** has a round hole **131** and an elastic reset assembly **132**, the round hole **131** is connected with the motion transmission cylinder **133**, and the elastic reset assembly **132** is pressed on the connecting rod **114** so the driving pawl **113** interacts with the combing assembly **102** continuously. The lever **115** has a rotary positioning cylinder **137**, slotted hole **136** and a supporter groove **138** of spring **116**, the rotary positioning cylinder **137** is fixed in the tab **153** of the lower covering unit **122**, and the slotted hole **136** is connected with the cylinder **135** of the connecting rod **114** to transfer the moment. The spring supporter groove **138** contains spring **116**, so the lever **115** can reset under the action of spring **116** after activated. Lever **115** extends toward center of combing assembly **102** with an arm containing slotted hole **136** extends toward sidewall of substance body **101**.

FIG. **13** is a structural illustration of the combing assembly in embodiment 2; FIGS. **13**A-D are structural illustrations of the combing assembly in different directions. As shown by FIGS. **13**A-D, the combing assembly **102** is comprised of a rotating body **117**, a comb teeth base plate **112** and six groups of replaceable comb teeth **111** arranged in the axial direction of the rotating body, the interval between two neighbor groups of the comb teeth **111** is 60°, and a group of comb teeth **111** has one row. The air intake **142** is set at the position rotates by 60° from the comb position along direction B in FIG. **16**.

Felts **118** are mounted at two ends of the rotating body **117** so the rotating body **117** is mounted in the circle **145** between the upper covering unit **110** and the lower covering unit **122** to ensure the rotating body **117** rotates around the axis and there is no gap between the rotating body **117**, the upper covering unit **110** and the lower covering unit **122**, so that pet hair are prevented from flying into two sides. Obviously the rotating body **117** is mounted inside of the hollow front section. One group of comb teeth **111** extends outside of the opening **150** to comb.

A 6-tooth ratchet wheel **147** which meshes with the driving pawl **113** is set at one end of the rotating body **117**, and the 6-tooth ratchet wheel **147** and the driving pawl **113** constitute into a rotation angle locating section to regulate that the rotation angle of the rotating body **117** is 60° in every rotation, and prevent rotating body **117** from reversing in use.

The pet groomer **100** also has a position limiting gear **119**, and a 6-tooth position limiting wheel **139** is set at the other end of the rotating body **117**. The 6-tooth position limiting wheel **139** and the above mentioned position limiting gear **119**, the guide holder **121** fixed between the upper covering unit **110** and the lower covering unit **122** and a spring **120** connect the two parts constitute into a position limiting unit. The end of the position limiting gear **119** connected with the spring **120** is inserted into the guide holder **121**, so the position limiting gear **119** flexibly extends in the guide holder **121** under the action of the spring **120**. When the rotating body **117** rotates by 60°, the position limiting gear **119** is meshed with the 6-tooth position limiting wheel **139** to prevent rotating body **117** from rotating reversely.

When the pet groomer is used to comb, firstly choose the rotating body **117** with proper length of comb teeth **111** to mount in the hollow front section according to pet hair

length to avoid scratching pet skin in combing, or to replace comb teeth **111** in the rotating body **117** with those of best lengths.

Then connect the pet groomer with a vacuum cleaner, and turn on vacuum cleaner. Then the comb use opening **150** and the air leakage opening **130** transmit airflows to the air intake **142** at the same time, and the airflow enters into vacuum cleaner through the suction channel **144**. Then the user holds the external wall of the suction channel **144** as the handle to comb pets. In the combing process, the pet's body blocks the comb use opening **150**, the airflow from the air leakage opening **130** to the air intake **142** helps reduce the suction force at the comb use opening **150** to avoid excessive suction that affects comfort of pets. After certain amounts of pet hair accumulated on the comb teeth, activate the lever **115** outside of the lower covering unit **122**, the connecting rod **114** drives the driving pawl **113** and the driving pawl **113** pushes the 6-tooth ratchet wheel **147** and therefore drives the rotating body **117** to rotate by 60°. Then a new group of comb teeth **111** is rotated to the comb position, so the user could continue to comb pets with this new group of comb teeth. The comb teeth **111** above mentioned with pet hair are rotated and fixed at the position opposite to the air intake **142**, to make sure sufficient suction airflow along the comb teeth extending direction vacuums hair from the comb teeth **111** into the air intake **142**, no need to strip off hair in the comb teeth **111** with external force. Because suction acts in the comb position in the whole process, no pet hair will drop down in the whole process.

Besides, if one or more pieces of comb teeth **111** are damaged, new comb teeth can be used to replace.

Function and Effects of Embodiment 2

The pet groomer **100** provided by the embodiment has a lever drive assembly to drive the rotating body **117** and move pet hair to the front of the air intake **142**, so airflows flowing towards air intake **142** take hair from comb teeth to vacuum cleaner in the comb teeth extending direction, and combed hair does not need to be stripped off from comb teeth with external force in advance, no pet hair would drop down in the combing process, thus not causing environmental pollution and avoiding allergen spreading. Besides, the substance body is detachable and easy for internal structure cleaning; the rotating body is replaceable, so user can choose proper comb length according to different pet hair. Every group of comb teeth is replaceable, so when one or more pieces of comb teeth **111** are damaged, new comb teeth may replace damaged ones, thus being environment-protection. Plus, choosing comb with proper teeth length according to different pet hair can improve the comfort level of pets in the combing process and avoid hurting pets at the same time. Pet hair are moved to air intake and vacuumed away once after the lever is activated. As a result the pet groomer **100** has the following features: simple structure, convenient use, labor saving, not tiring to use and no harm to user's health.

The clamp ring **123** can screw back and forth to mesh with the steps of the upper covering unit **110** and the lower covering unit **122** to make both covering units lock together tightly; the upper covering unit **110** and the lower covering unit **122** could also be connected together through a locking groove.

The comb teeth **111** in the embodiment are in six groups, can also be in other integral group(s), and every group may has one or more rows; the quantity of the comb teeth **111** in every row is also subject to requirements, such as 20 pieces, 30 pieces, 40 pieces, 50 pieces and 60 pieces; the diameter of the comb teeth **111** is also subject to requirements, for example, ϕ0.3, ϕ0.5, ϕ0.6, ϕ0.8, ϕ1.0, ϕ1.2, ϕ1.5, etc. The material of the comb teeth **111** is also subject to requirements like stainless steel 304, stainless steel 201, 45# plated steel, plastic PP, etc.; the top surface shape of the comb teeth **111** may be flat or others like ball-shape.

The comb teeth **111** are firstly connected with the base plate **112**, then fixes the base plate **112** into the rotating body **117**. The base plate **112** of the comb teeth and the rotating body **117** may also be connected with a pressing plate, or by other methods. Of course the comb teeth **111** may also be mounted on other carriers and then on the rotating body. The comb teeth **111** may be a movable structure convenient for repair and replacement, or permanently fixed in the rotating body **112**.

Besides, the lower covering unit **122** and the bottom back plate **124** may be connected in others ways, such as through a buckle or by ultrasonic welding.

Embodiment 3

FIG. **18** is a side perspective view of the pet groomer in embodiment 3; FIG. **19** is a bottom perspective view of the pet groomer in embodiment 3; FIG. **20** is an exploded view of the pet groomer in embodiment 3; FIG. **21** is a semi-exploded view of the pet groomer in embodiment 3; FIG. **23** is an inverted side section view of the pet groomer in embodiment 3: FIG. **24** is a top view of the pet groomer in embodiment 3; FIG. **25** is an A-A section view of FIG. **24**; FIG. **26** is a B-B section view of FIG. **24**. As shown by FIG. **18**, FIG. **19**, FIG. **20**, FIG. **21**, FIG. **23**, FIG. **24**, FIG. **25** and FIG. **26**, a pet groomer **200** to be used together with the suction hose of vacuum cleaner includes a substance body **201**, a combing assembly **202** and a driving assembly **203**.

The substance body **201** has an upper covering unit **233** and a lower covering unit **232**. The lower covering unit **232** is consisted of a front section and a rear section; and a suction channel **248** is set at the rear end to be connected together with the suction hose of a vacuum cleaner, and the external wall of the suction channel **248** also serves as a handle for users to operate and use the pet groomer **200**; half circles **252** are set at two side ends of the front section respectively and form two circles together with the upper covering unit **233** for installing the combing assembly **202**.

The front section of the lower covering unit **232** has a round hole **258**, a cylinder **253** is set at the front end of the upper covering unit **233**, and the cylinder **253** is installed in the round hole **258** to make the upper covering unit **233** rotate relative to the lower covering unit **232**.

A locking ring **231** is also set in the substance body **201** which is used to combine the half circle structure at the rear end of the upper covering unit **233** with the corresponding circle in the junction area of the front and rear section of the lower covering unit **232** and clamp the upper covering unit **233** with the lower covering unit **232** tightly. The locking ring **231** is detachable.

When it is necessary to replace the combing assembly **202** or clean the parts between the upper covering unit **233** and lower covering unit **232**, demount the locking ring **231** to twist and turn the upper covering unit **233** relative to the lower covering unit **232**, and obviously the combing assembly **202** installed between the upper covering unit **233** and the lower covering unit **232** is replaceable.

An air transmission channel is set in the lower covering unit **232** and connected with the suction channel **248**. A primary air intake **270** is set accordingly in front of the air transmission channel to transmit air into the air transmission channel. After the upper covering unit **233** and the lower covering unit **232** are combined, the baffle **251***b* in upper

covering unit **233** and the corresponding baffle **251***a* in the lower covering unit **232** form a secondary air intake **251** (See FIG. **25**) to transmit air to the suction channel **248**. The best preference of air intake length is, at least one air intake to be longer than the contour length of any group of comb teeth **225** distributed on rotating body **226**. A hollow front section is placed outside of the primary air intake **270** and the secondary air intake **251**. A comb use opening **257** and an air leakage opening **256** are set in the hollow front section.

A separating plate **221** is fixed between the upper covering unit **233** and the lower covering unit **232**, and the separating plate **221** and the lower covering unit form an actuator container, which is used to store the driving assembly **203**, to make sure pet hairs vacuumed from the air intake enter into the suction channel **248** directly and not affect normal movements of the driving assembly.

The driving assembly **203** is formed from press-button drive assembly, which is consisted of a driving pawl **222**, a connecting rod **223** and a press-button **220** which passes through the separating plate **221** and the upper covering unit **233** and is near the suction channel **248**.

The connecting rod **223** has a positioning cylinder **245**, a slotted hole **262** connected with the button **220**, a driving cylinder **243** connected with the driving pawl **222** and a spring **260**. The positioning cylinder **245** is fixed on the locating tab **250** in the lower covering unit **232**. The driving cylinder **243** transmits force to move the driving pawl **222**. One end of the spring **260** is fixed with the spring fixing cylinder **259** in the lower covering unit **232** to make sure the button could reset automatically after pressed down.

The button **220** has a cylinder **240** which is clamped into the slotted hole **262** in the connecting rod **223** to drive the connecting rod **223**, so the user could operate the button with his thumb when holding the external wall of the suction channel **248** to drive the combing assembly **202**.

A round hole **242** and a resetting spring **241** are set in the driving pawl **222**, the round hole **242** is connected with the driving cylinder **243**, and the resetting spring **241** is pressed on the connecting rod **223** to produce elastic force which ensures interaction between the driving pawl **222** and the combing assembly **202**.

FIGS. **22**A-D are structural illustrations of the combing assembly of the pet groomer in embodiment 3, of which views a, b, c and d are structural illustrations of the combing assembly in different directions. As shown by FIGS. **22**A-D, the combing assembly **202** is consisted of a rotating body **226** and six groups of replaceable comb teeth **225** distributed in axial direction in the rotating body **226**. The circular pitch of two adjacent groups of comb teeth **225** is 60°, of which every group includes one row of comb teeth **225**. The primary air intake **270** is set at the position rotated by 60° from the comb position along direction C in FIG. **27**, and the secondary air intake **251** is set at the position rotated by 120° from the comb position along direction C in FIG. **27**. The comb teeth **225** which has combed pet hair is turned to the primary air intake **270** firstly and then the secondary air intake **251**.

Felts **227** are installed at two ends of the rotating body **226**, so the rotating body **226** is installed in the circle **252** between the upper covering unit **233** and lower covering unit **232** to make sure that the rotating body **226** rotates around the axis and the rotating body **226** is tightly combined with the upper covering unit **233** and lower covering unit **232** to avoid hairs and other sundries from flying to two sides. Obviously the rotating body **226** is inside of the hollow front section. A group of comb teeth **225** extends outside of the comb use opening **257** to comb pet hairs.

A 6-tooth ratchet wheel **255** which meshes with the driving pawl **222** is set at one end of the rotating body **226**, and the 6-tooth ratchet wheel **255** and the driving pawl **222** constitute into a rotation angle locating section to regulate that the rotation angle of the rotating body **226** is 60° in every time, and prevent it from reversing in use.

The pet groomer **200** also has a position limiting pawl **228**, and a 6-tooth position limiting wheel **247** is set at the other end of the rotating body **226**. The 6-tooth position limiting wheel **247** and the above mentioned position limiting pawl **228**, the guide holder **230** fixed between the upper covering unit **233** and the lower covering unit **232** and a spring **229** connect the two constitute into a position limiting unit. The end of the position limiting pawl **228** connected with the spring **229** is inserted into the guide holder **230**, so the position limiting pawl **228** flexibly extends in the guide holder **230** under the action of the spring **229**. When the rotating body **226** rotates by 60°, the position limiting pawl **228** is meshed with the 6-tooth position limiting wheel **247** to prevent the rotating body **226** from rotating reversely

When the pet groomer **200** is used to comb pet hair, firstly choose the rotating body **226** with proper length of comb teeth **225** to install in the hollow front section according to different pet hairs, and avoid scratch of pet skin owing to unsuitable lengths of comb teeth during the combing process. Or just replace comb teeth **225** in the rotating body **226** to adapt to lengths of pet hairs to be combed.

Then connect the pet groomer **200** with a vacuum cleaner, and turn on vacuum cleaner. Then the comb use opening **257** and the air leakage opening **256** transmit airflows to the primary air intake **270** and the secondary air intake **251** at the same time, and the airflow enters into vacuum cleaner through the suction channel **248**. Then the user holds the external wall of the suction channel **248** as the handle to comb pet. In the combing process, the pet body blocks the comb use opening **257**, the airflow from the air leakage opening **256** to the primary air intake **270** and the secondary air intake **251** reduces suction force in comb use opening **257**, so no excessive air force is in the comb use opening **257** to make pet uncomfortable when combed.

After certain amounts of hairs are accumulated on the comb teeth, press down the button **220** in the upper covering unit **233**. The button **220** drives the connecting rod **223** to move through the cylinder **240**, the connecting rod **223** moves around the cylinder **245** under the driving force of the button **220**, the driving pawl **222** is driven to move by the cylinder **243** when the connecting rod **223** moves, the driving pawl **222** pushes the ratchet wheel **255** in the rotating body **226** to rotate, then the rotating body **226** is driven to rotate in direction C in FIG. **25**, and the comb teeth **225** and the rotating body **226** rotate by 60° synchronously. A new group of comb teeth **225** is at the comb position, and the user may use the group of comb teeth to comb pet continuously. The comb teeth that has combed pet is opposite the primary air intake **270** now, and the comb teeth that faced the primary air intake **270** is now opposite the secondary air intake **251**, and so on, so hairs not cleared away in the primary air intake can be completely vacuumed away in the secondary air intake; as suction always acts at the comb position in the process, hairs will not drop down in the whole combing process. Besides, if one or more pieces of comb teeth **225** are damaged, new comb teeth can be used to replace the group of comb teeth.

Function and Effects of Embodiment 3

The pet groomer **200** provided by the embodiment has the press-button drive assembly to drive the rotating body **226** and move pet hairs to the front of the primary air intake **270**, so hairs are vacuumed into airflows in the comb teeth extending direction and into vacuum cleaner. As the pet groomer also has the secondary air intake **251** which further clear away hairs left from the primary air intake **270**, hairs need not be stripped off from comb teeth with external force in advance and all hairs on the comb teeth can be vacuumed into vacuum cleaner by the airflow, so no loose hair can fall off from pet body in grooming to pollute environment or to transmit allergen material. Besides, the substance body is detachable and easy for internal structure cleaning; the rotating body is replaceable, so different rotation bodies with suitable comb teeth can be installed on the pet groomer according to different pet hairs. Every group of comb teeth is replaceable, so when one or more pieces of comb teeth **225** are damaged, new comb teeth may replace damaged ones, thus being environment-protection. Plus, proper comb teeth may be chosen according to different pet hairs to make pet more comfortable and avoid hurting pet when combed. Pet hairs are moved to the air intake once the button is pressed, thus avoiding intermediate actions such as stripping off hair from comb teeth or similar actions. As a result the pet groomer **200** has the following features: simple structure, convenient use, labor saving, not tiring for use and no harm to user's health.

The locking ring **231** in the embodiment can screw back and forth, so the locking ring **231** can be meshed with the steps of the upper covering unit **233** and the lower covering unit **232**, to make the upper covering unit **233** and the lower covering unit **232** are tightly clamped; the upper covering unit **233** and the lower covering unit **232** could also be connected through locking slot to make the upper covering unit **233** and the lower covering unit **232** tightly clamped.

The comb teeth **225** in the embodiment is in six groups, can also be other integral group(s), and every group may has one or more rows: the quantity of the comb teeth **225** in every row is also subject to requirements, such as 20 pieces, 30 pieces, 40 pieces, 50 pieces and 60 pieces; the diameter of the comb teeth **225** is also subject to requirements, for example, ϕ0.3, ϕ0.5, ϕ0.6, ϕ0.8, ϕ1.0, 1.2, 1.5, etc. The material of the comb teeth **225** is subject to requirements likewise like stainless steel 304, stainless steel 201, 45# plated steel, plastic PP, etc.; the top surface shape of the comb teeth **225** may be flat or other shape like ball shape.

The comb teeth **225** in the embodiment is of moveable structure for repair and replacement; or the comb teeth may be firstly installed on carriers and then the comb teeth carrier is connected with the rotating body.

Embodiment 4

FIG. **27** is a front perspective view of the pet groomer in embodiment 4; FIG. **28** is a bottom perspective view of the pet groomer in embodiment 4; FIG. **29** is an exploded view of the pet groomer in embodiment 4; FIG. **30** is a bottom exploded view of the pet groomer in embodiment 4;

FIG. **32** is an inverted side section view of the pet groomer in embodiment 4; FIG. **33** is a top view of the pet groomer in embodiment 4; FIG. **34** is an A-A section view of FIG. **33**; FIG. **35** is a B-B section view of FIG. **33**. As shown by FIG. **27**, FIG. **28**, FIG. **29**, FIG. **30**, FIG. **32**, FIG. **33**, FIG. **34** and FIG. **35**, the pet groomer **300** for connecting with the suction hose of a vacuum cleaner includes a substance body **301**, a combing assembly **302** and a driving assembly **303**. The combing assembly **302** is consisted of a rotating body **316** and multi-rows of comb teeth on the rotating body **316**. One end of the rotating body is a 6-tooth ratchet wheel with many tooth spaces.

The substance body **301** has an upper covering unit **310** and a lower covering unit **324**. The lower covering unit **324** is comprised of the front section and the rear section and a suction channel **349** is set at the rear section to be connected with the suction hose of cleaner. The external wall of the suction channel **349** also serves as a handle for users to operate and use the pet groomer **300**; circles **350** are set at two side ends of the front section (See FIG. **29**), and the circles **350** is used to install the end cap **314** of the rotating body **316**. Besides, the front section also has a buckle **339**, a slot **331** is set at the front section of the upper covering unit **310**, and the slot **331** and the buckle **339** are fastened so that the upper covering unit **310** and the lower covering unit **324** can be tightly combined together. Substance body **301** (also named as main body) comprises two side walls, wherein the combing assembly **302** is fixed.

A locking ring **323** is also set in the substance body **301** to combine the half circle structure at the rear end of the upper covering unit **310** with the corresponding half circle at the middle of the lower covering unit **324** and clamp the upper covering unit **310** with the lower covering unit **324** tightly. The locking ring **323** is detachable. When it is necessary to replace the combing assembly **302** or clean the parts between the upper covering unit **310** and lower covering unit **324**, demount the locking ring **323** to demount the upper covering unit **310** and the lower covering unit **324**, and obviously the combing assembly **302** installed between the upper covering unit **310** and the lower covering unit **324** is replaceable.

After the upper covering unit **310** is combined with the lower covering unit **324**, the baffle **347** in the upper covering unit **310** and the corresponding baffle **348** in the lower covering unit **324** combine and form an air intake **346** (See FIG. **34**) to transmit air into the suction channel **349**. The best preference for the length of air intake **346** is to be longer than the contour length of any group of comb teeth **315** distributed on rotating body **316**. A hollow front section is placed outside of the air intake **346**, and a comb use opening **332** and an air leakage opening **330** are set in the hollow front section.

Aback-plate **327** is set at the bottom of the lower covering unit **324**, a screw hole **351** is set at the back plate **327**, a screw boss **352** corresponding to the screw hole **351** is set on the lower covering unit **324**, the back plate **327** is reliably connected with the lower covering unit **324** through the screw **328**, and the space between the back plate **327** and the lower covering unit of the air transmission channel (i.e. actuator container) is used to contain the driving assembly **303**.

The substance body **301** can also has a universal adaptor to be connected with vacuum cleaner (See FIG. **29**). The universal adaptor includes an adapting tube **390**, a flexible hose **391**, an inner ring **392**, a sealing ring **393** and an adjusting ring **394**. The inner ring **392**, the sealing ring **393** and the adjusting ring **394** constitute a universal adaptor which could adjust its inner diameter to adapt to suction hoses of different outer diameters and realize sealing connection. The adapting tube **390** can be connected with the suction channel **349** of the lower covering unit **324**. The adapting tube **390** and the inner ring **392** are connected with one end of the flexible hose **391** respectively. The sealing ring **393** is for connecting the suction hose of vacuum cleaner.

The driving assembly **303** is formed from a lever drive assembly, which is consisted of a cam assembly and a connecting rod driving assembly. The connecting rod driving assembly has a connecting rod **318** and a lever **325** exposed outside of the actuator container.

The lever is integrated from a cap **342**, a cylinder **341** and a driving track **340**. The cap **342** is exposed outside of the actuator container and extends towards the suction channel **349**. User could activate the cap **342** by grasping the external wall of the suction channel **349**. The cylinder **341** is located between the cap **342** and the driving track **340** and fixed on the positioning tab **354** on the lower covering unit **324** (See FIG. **30**). The driving track **340** is connected with the passive cylinder **336** of the connecting rod **318** to transmit torque force to the connecting rod **318**. The connecting rod **318** has a supporting cylinder **344**, the passive cylinder **336** and a driving cylinder **335**, and the supporting cylinder **344** is fixed in the locating hole **355** of the lower covering unit **324** (See FIG. **30**). The connecting rod driving assembly also has a connecting rod block **317** which is used to press the connecting rod **318** tightly and prevent the connecting rod **318** from falling off. The cam assembly is consisted of a cam **311**, a cam track **334** and a driving pawl unit, of which the cam **311** has an installing hole **333** (See FIG. **29**) and a driving pawl chamber **353** which is integrated with the cam **311** (see FIG. **32**). The rotating body **316** has a 6-tooth ratchet wheel **337**, and the cylinder **345** is installed on the side of the 6-tooth ratchet wheel **337**. The cylinder **345** threads the installing hole **333** in the cam **311** and then is connected with the cap **314**, so the cam **311** is able to rotate coaxially with the rotating body **316**. Lever **325** extends from cap **342** toward center of combing assembly **302** with an arm containing driving track **340** extends toward sidewall of substance body **301**, driving assembly from driving track **340** till combing assembly **302** extends alongside sidewall of main body **301**, and all driving assembly **303** is isolated from suction airflow with cap **342** exposed outside for operation.

The cam track **334** is engaged with the driving cylinder **335** on the connecting rod **318** and therefore the connecting rod driving assembly and the cam assembly is combined. When the connecting rod **318** rotates, the driving cylinder **335** drives the cam track **334** on the cam **311** to move towards the direction opposite to the rotation direction of said rotating body **316**, so the cam assembly rotates around the cylinder **345** on the rotating body **316**.

The driving pawl unit has the driving pawl **313**, and the driving pawl **313** is meshed with the tooth space of the 6-tooth ratchet wheel **337** installed on the rotating body **316**. The driving pawl unit also includes the driving pawl chamber **353** within the cam **311** and the spring **312** of which one end is connected with the driving pawl **313** and the other end sticks to the inner wall of the driving pawl chamber **353**. A spring locating hole **356** is set on the driving pawl **313**, one end of the spring **312** is in the spring locating hole **356**, and the other end of the spring **312** extends outside of the driving pawl **313** and sticks to the inner wall of the driving pawl chamber **353**, so the driving pawl **313** acts on the surface of the 6-tooth ratchet wheel **337**. The 6-tooth ratchet wheel **337** is in circular arc shape, the driving pawl sticks to the surface of the ratchet wheel constantly and moves from one tooth space to next and mesh with the next tooth space.

When the cap **342** of the lever **325** is activated, the lever **325** rotates around the cylinder **341**, then the driving track **340** drives the passive cylinder **336** of the connecting rod **318** to move, then the connecting rod **318** rotates around the supporting cylinder **344**, the driving cylinder **335** of the connecting rod **318** moves to drive the cam track **334** of the cam assembly to move in the peripheral direction of the rotating body **316**, the cam assembly rotates around the installing cylinder **345** of the rotating body **316**, i.e. rotating coaxially with the rotating body. When the cam assembly rotates, the driving pawl **313** is driven to move, and the driving pawl **313** sticks to the surface of the 6-tooth ratchet wheel **337** on the rotating body **316** and meshes with the tooth space of the 6-tooth ratchet wheel, so the driving pawl **313** drives the 6-tooth ratchet wheel **337** to rotate and the rotating body **316** rotates around the installing cylinder **345** (See FIG. **32**). When the lever **325** is released, the lever **325** rotates around the cylinder **341** to return back under the elastic force of the spring **326**, and the connecting rod **318** and cam reset accordingly at the same time, this makes the cam track **334** move in the direction opposite to the rotation direction of rotating body **316**.

FIGS. **31**A-D are structural illustrations of the combing assembly of the pet groomer in embodiment 4; views a, b, c and d are structural illustrations of the combing assembly in different directions. As shown by FIGS. **31**A-D, the combing assembly **302** is consisted of the rotating body **316** and six groups of comb teeth **315**, the pitch of every group of comb teeth **315** is 60°, every group of comb teeth **315** is in two rows, and one group of comb teeth **315** out of the six groups of comb teeth **315** necessarily extends outside of the comb use opening **332** to comb pet hairs. Obviously a group of comb teeth **315** can have one or more rows.

Two installing cylinders **345** at two ends of the rotating body **316** extend outwards along the axis of the rotating body **316** to install and limit the rotating body **316** is always inside the hollow front section.

The 6-tooth ratchet wheel **337** which mesh with the driving pawl **313** is set at one end of the rotating body **316**, and the 6-tooth ratchet wheel **337** and the cam assembly constitute a rotation angle locating section to regulate that the rotation angle by which the rotating body **316** rotates every time is 60°, and prevent rotating body **316** from reversing in use. The ratchet wheel may be designed as 8-tooth ratchet wheel and constitutes a rotation angle locating section together with the cam assembly to regulate that rotation angle by which the rotating body **316** rotates every time is 45°. Obviously the shape of the ratchet wheel may be designed on requirements to realize other different rotation angles, and the best plan is to have rotation angles as integral times of 10° or 15°.

The air intake **346** is set in the position rotated by 120° in direction D in FIG. **34** from the comb position. Necessarily one group of comb teeth is fixed to right face the air intake **346** when the rotating body rotates every time, and air intakes may be set in angles integral times of 60° or 45° if necessary.

The pet groomer **300** also has a position limiting pawl **319**, and a 6-tooth position limiting wheel **338** is set at the other end of the rotating body **316**. The 6-tooth position limiting wheel **338** and the above mentioned position limiting pawl **319**, the guide holder **321** fixed between the upper covering unit **310** and the lower covering unit **324** and the spring **320** connects the two constitute into a position limiting unit. The end of the position limiting pawl **319** connected with the spring **320** is inserted into the guide holder **338**, so the position limiting pawl **319** flexibly extends in the guide holder **321** under the action of the spring **320**. When the rotating body **316** rotates by 60°, the position limiting pawl **319** is meshed with the 6-tooth position limiting wheel **338** to prevent the rotating body **316** from rotating reversely. The position limiting pawl **338** may

be also designed in 8-tooth, and after the rotating body **316** rotates by 45°, the position limiting pawl **319** meshes with the 8-tooth position limiting wheel **338** and prevents the rotating body **316** from rotating reversely.

The length of the comb teeth on the rotating body **316** may vary. When the pet groomer is used to comb pet hair, firstly choose the rotating body **316** which has corresponding length of comb teeth **315** to be installed inside of the hollow front section according to different pet hairs to avoid hurting pet skin due to improper lengths of comb teeth. Or replace the rotating body **316** directly to adapt to pet hair to be combed.

When the pet groomer is used, firstly connect the pet groomer with a vacuum cleaner, and turn on the vacuum cleaner. Then the comb use opening **332** and the air leakage opening **330** transmit airflows to the air intake **346** at the same time, and the airflow enters into vacuum cleaner through the suction channel **349**. In the combing process, the pet body blocks the comb use opening **332**, and the airflow from the air leakage opening **330** to the air intake **346** reduces the suction force at the comb use opening **332** to the pet body and effectively preventing excessive suction from affecting the comfort level of pet. After a certain amount of hair is accumulated on the comb teeth, activate the lever **325**, the lever **325** drives the connecting rod **318** through the driving track **340**, the connecting rod **318** drives the cam assembly to rotate, and the cam assembly drives the driving pawl **313** to rotate on the surface of the 6-tooth ratchet wheel and extend flexibly in the axial direction of the cam under the elastic force of the spring, so the 6-tooth ratchet wheel **337** is driven to rotate, then the rotating body **316** is driven to rotate by 60° by every activation. Then a new group of comb teeth **315** is rotated to the comb position, user may continue combing pet hair with the new group of comb teeth, and the comb teeth **315** that has combed pet hair is rotated by 60°. When a certain amount of pet hair is accumulated on the comb teeth at the comb position, activate the lever again, the present comb teeth **315** is rotated by another 60°, the previous comb teeth **315** with hair is rotated to the air intake **346**, and hair will be vacuumed into the air intake **346** from the comb teeth **315**, no external force is needed to strip off hair from comb teeth in advance. Because the suction acts at the comb position in the whole process, hairs will not drop down. The rotation angle of the comb teeth **315** may be other angles if necessary, and the best plan is integral multiples of 10° or 15°.

When comb teeth with hair are rotated to the position close to the air intake, in order to ensure pet hair wound on comb teeth can be vacuumed away completely, make sure every piece of comb teeth in this group points at the middle of the air intake, so the extending direction of every piece of comb teeth in the group keeps consistent with the vacuuming direction of the main suction airflow, rigorous paralleling is preferred, and make sure every piece of comb teeth in the group is inside of the main vacuuming airstream completely instead of partly, so the suction airflow could clear hairs away by overcoming only the frictional force between hair and smooth comb teeth.

Function and Effects of Embodiment 4

The driving pawl, which moves flexibly in axial direction of cam and meshes with the tooth space of the ratchet wheel, is adopted in the embodiment and constantly sticks to the surface of the ratchet wheel, moves from one tooth space to the next one, and meshes with the next tooth space to make sure the driving pawl drives the ratchet wheel to rotate by required angle, the structure is stable and reliable; besides, the pet groomer has a lever drive assembly to drive the rotating body **316**, and pet hair is moved to close to the air intake **346**, so pet hair is vacuumed into vacuum cleaner in the extending direction of the comb teeth and does not need external force to strip off hair from comb teeth in advance. No loose hair can fall off from pet body in grooming to pollute environment or to transmit allergen material. Besides, the substance body is detachable and easy for internal structure cleaning; the rotating body is replaceable, so different rotation bodies with proper comb teeth can be installed on the pet groomer according to different pet hair. Every group of comb teeth is replaceable, so when one or more pieces of comb teeth **315** are damaged, new comb teeth may replace damaged ones, thus being environment-protection. Plus, proper comb teeth may be chosen according to different pet hairs to make pet more comfortable and avoid hurting pet at the same time when combed. Pet hairs are moved to the air intake once the lever is activated, so the structure is simple and the operation is convenient. The pet groomer can be connected with the suction hose of vacuum cleaner through a flexible hose to realize convenient grooming, labor saving and not to fatigue the user easily; an adjusting ring is adopted in this case to adjust the sealing ring to be connected with the suction hose of vacuum cleaner which has different diameters, thus making the use more convenient.

In the pet groomer in embodiment 4, the external wall of the suction channel is used as the handle to grasp the pet groomer. Handles may be set in the upper covering unit or other proper positions of the pet groomer of the present invention to enable the user to operate and control the pet groomer conveniently.

The connecting rod driving assembly of the present invention extends outside of the substance body, and the part for the user to operate the pet groomer in embodiment 4 is a lever. Obviously the lever may be replaced by a press button and other driving parts.

One air leakage opening is set on the substance body of the present invention in embodiment 4, and obviously more air leakage openings may be set at other positions of the substance body if necessary to prevent excessive air force at the comb use opening from affecting the comfort level of pet when combed.

One group of comb teeth is arranged by every 60° in the present invention in embodiment 4, and altogether six groups are arranged, which could also be replaced by three groups of comb teeth uniformly distributed on the rotating body. When the comb teeth are in three groups, the circular pitch of every group is 120° and these three groups are uniformly distributed on the rotating body **316**, after a certain amount of pet hair is accumulated on the comb teeth at the comb position, once the lever **325** is activated, the comb teeth **315** are still rotated by 60°, and there are no comb teeth **315** under combing status at the comb position, so hair from pet body or dropping to the ground may be vacuumed through the comb use opening **332**. When the lever **325** is activated again, the comb teeth **315** with hair are rotated to the air intake **346**, adequate suction is at the air intake **346** to vacuum pet hair from comb teeth **315** to the air intake, and meanwhile another group of comb teeth **315** is under combing status and continues to comb pet hair.

The comb teeth on the rotating body may also be in four groups which are uniformly distributed on the rotating body with a circular pitch of 90°. After a certain amount of pet hair is accumulated on the comb teeth at the comb position, once the lever **325** is activated, the comb teeth **315** are rotated by 45°, and there are no comb teeth **315** under combing status at the comb position, so hair from pet body or dropping to

the ground may be vacuumed through the comb use opening **332**. When the lever **325** is activated again, the comb teeth **315** with hair are rotated by 90° totally from beginning, and then another group of comb teeth **315** is under combing status and continues to comb pet hair. When lever **325** is activated by the 3<rd> time, the 1<st> group of comb teeth **315** with hair are rotated to the air intake **346**, adequate suction is at the air intake **346** to vacuum pet hair from comb teeth **315**, and meanwhile there are no comb teeth **315** under combing status at the comb position, so hair from pet body or dropping to the ground may be vacuumed through the comb use opening **332**.

Comb teeth on the rotating body may be distributed in different angles if necessary and withdrawn in correspondingly proper circular pitch. In the present invention, when the group number of comb teeth is m (m is an integral number), the quantity of tooth spaces on the ratchet wheel is recommended to be integral multiples of m.

When the comb teeth could be withdrawn in the pet groomer, in order to facilitate convenient use, an operation unit is set to the main body which sends corresponding information to inform the status of the pet groomer according to the fact whether comb teeth are at the comb position or not. When there are no comb teeth extending outside of the comb use opening, i.e. the pet groomer is under comb teeth protecting status, the operating and prompting unit sends corresponding signals to inform the user of the comb teeth protecting status, and after the lever is activated for n (n is an integral number) times, one group of comb teeth extends outside of the comb use opening; when one group of comb teeth is at the comb use opening, i.e. the pet groomer is under combing status, the operating and prompting unit sends corresponding signals to inform the user of the combing status, the user could comb pet hair, and if the comb teeth need to be withdrawn in the pet groomer, the lever should be activated for m (m is an integral number) times. Obviously under two circumstances that three groups of comb teeth are set when the rotation angle is 60° and four groups of comb teeth are set when the rotation angle is 45°, when there are no comb teeth at the comb position, i.e. the pet groomer is under comb teeth protecting status, the operating and prompting unit sends corresponding signals to inform the user of the comb teeth protecting status, and the connecting rod driving assembly is driven to make one group of comb teeth extend outside of the comb use opening; when one group of comb teeth is under combing status at the comb position, i.e. the pet groomer is under combing status, the operating and prompting unit sends corresponding signals to inform the user of the combing status, the user could comb pet hair, and if the comb teeth need to be withdrawn in the pet groomer, the connecting rod driving assembly should be driven for one time.

As a specific plan, we may adopt indicators of two different colors to send corresponding signals, and give further descriptions about indicators with words or graphs.

Besides, if one or more pieces of comb teeth **315** are damaged, new comb teeth can be used to replace or just turn to a new rotating body with proper comb teeth.

The locking ring **323** in the embodiment connects the upper covering unit **310** with the lower covering unit **324** through the locking groove to make the upper covering unit **310** and the lower covering unit **324** tightly locked.

The comb teeth **315** in embodiment 4 are in six groups, and it can also be in other integral group(s), for example, three groups, four groups, eight groups, etc., and every group may has one or more rows; the quantity of the comb teeth **315** in every row is also subject to requirements, such as 20 pieces, 30 pieces, 40 pieces, 50 pieces and 60 pieces; the comb teeth of different rows may be distributed on the rotating body in a staggered arrangement way.

Besides, six groups of comb teeth **315** in the embodiment all are distributed perpendicular to the rotating body, so the pointing direction (i.e. the extending direction of the comb teeth) of every group of comb teeth when rotated to the air intake is consistent with the main direction of the airflow which is vacuumed into the air intake. In the pet groomer of the present invention, the comb teeth may be distributed in the rotating body in other forms (such as curve extending way), as long as every piece of comb teeth in the group points at the air intake and gets in the main channel of vacuuming airflow when rotated to the front of air intake.

The diameter of the comb teeth in the present invention is also subject to requirements, for example, ϕ0.3, ϕ0.5, ϕ0.6, ϕ0.8, ϕ1.0, ϕ1.2, ϕ1.5, 1.8, ϕ2.0, ϕ2.5, etc.; the material of the comb teeth **315** is subject to requirements likewise like stainless steel 304, stainless steel 201, 45# chromed steel, plastic PP, plastic PVC etc.; in order to prevent plastic comb teeth **315** from producing static electricity, antistatic agent may be added to the material, or static may be eliminated by adding a metal strip. The top surface shape of the comb teeth **315** may be flat or other shape like ball-shape. Some rectangular or round ventilating slots may be added to the surface of the rotating body **316** to help vacuuming pet hair on the comb teeth. The rotating body surface may have some grooves **343** to clear away pet hair which is winded on the rotating body more easily.

The comb teeth **315** may be firstly connected with comb teeth base plate, then the comb teeth base plate assembled on the rotating body **316**, and the comb teeth base plate and the rotating body **316** can also be connected through a pressing plate, etc. Of course the comb teeth **315** may also be installed on other carriers and then on the rotating body. The comb teeth **315** may be a movable structure convenient for repair and replacement, or directly fixed in the comb teeth rotating body **316**.

Besides, the lower covering unit **324** and the bottom back plate **327** may be connected in others ways, such as through a buckle or ultrasonic welding.

It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad inventive concept thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover modifications within the spirit and scope of the present invention as defined by the appended claims.

The invention claimed is:

1. A pet groomer which is used in conjunction with a suction hose of a vacuum cleaner, comprising:

a main body comprising two sidewalls, an actuator container, and a hollow handle for connecting with said suction hose, an internal channel of said hollow handle serve as a flow channel for a suction airflow;

a comb assembly to comb a pet, fixed between said two sidewalls, comprising at least one rotatable body, and at least one group of comb teeth arranged in an axial direction of said rotatable body;

a driving assembly to drive said comb teeth on said combing assembly to rotate with said rotatable body;

wherein said comb teeth is configured to rotate between a first position and a second position, wherein said comb teeth extends outwardly in said first position to comb the pet, wherein said comb teeth is close to said actuator container in said second position and points to a flow direction of said suction airflow;

wherein said driving assembly is isolated from said suction airflow;

wherein said driving assembly comprises:

at least one actuator element exposed out of said actuator container and extending toward said hollow handle; and

motion transmission elements, extending from said actuator element to said comb assembly, comprising three sections, wherein a first section extends from said actuator element toward the center of said combing assembly, a third section extends alongside at least one sidewall of said main body to said combing assembly, and a second section connects said first section and said third section.

2. The pet groomer of claim **1** connected to said suction hose directly or indirectly through an adaptor.

3. The pet groomer of claim **1**, wherein said main body comprises a hollow front section, said hollow front section comprises an opening, from where said comb teeth can extend outwardly to comb the pet.

4. The pet groomer of claim **3**, wherein an air leakage window is set in said main body to prevent excessive suction force on the pet's body in combing.

5. The pet groomer of claim **4**, wherein said air leakage window is configured to guide in an airflow to strip loose hair from said comb teeth together with said suction airflow in from a down side when said comb teeth is in said second position.

6. A vacuum cleaner comprises a suction hose and a pet groomer of claim **1** in conjunction with said suction hose.

* * * * *